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Gipsy's Warning

AT the beginning of the year we indulged in some customary sooth-saying (THE CHEMICAL AGE, 1955, **72**, 113). The high tide of 1954's prosperity still seemed in its full flow and there appeared to be every reason not to soil optimism with streaks of gloom or doubt. No role is more uncomfortable than that of the solitary pessimist. However, we did not entirely choose the way of comfort, enticing though that was, and now that we have come to Budget month, the time for realistic national reckonings and stock-taking, a few lines from our turn-of-the-year commentary seem more pointed in repetition than in first performance. 'And yet——? Is there a catch somewhere ? Is it normal to count upon so much stability and prosperity ? Only yesterday we were switchbacking from one economic crisis to the next. How sound is our new-won soundness ?'

There was indeed a 'catch somewhere' and it has been starkly revealing itself throughout the last three months. Too much of 1954's prosperity was inflationary in both nature and effect ; and even some sizeable portion of our general trade recovery of 1951/54—though it seemed to have been real enough—was in fact based upon fortuitiously favourable terms of trade. To make this latter point is not to take one side or the other in the perpetual party-political debate ; indeed, no subject of national importance is more bedevilled by politics than British economics. As is made clear in the latest Bulletin for Industry issued by the Treasury, the trade gap has been steadily and seriously widening in recent months. For the five months ending in February 1954, costs of imports exceeded those of exports by £189,000,000 ; but for the same period ending in February 1955, the excess was £320,000,000. An increase of almost 70 per cent in the gap, and this despite the fact that total export value had actually risen by 2½ per cent. In other words, the battle of the gap is not only still raging but it has taken a turn for the worse. It is not enough to say that our income from exports is rising slightly, or that it is being maintained in the face of wider and stiffer competition. When the costs of imports are rising much more steeply we are not moving towards prosperity—we are, whether we like to face the fact or not, moving away from it.

Over the two five-months' periods which have just been compared, total import costs rose by £160,000,000. This is approximately an increase of 12 per cent. About half this increase can be attributed to a greater consumption of imported

materials and goods ; the other half, however, is attributable to their increased prices. There are thus two separate factors threatening our recovery since the war and all that we call our standard of living. We are consuming more imported goods than we are actually earning by exports, a factor considerably, if not wholly, within our control. Second, we are having to pay more for these imports than we did in 1951-53, a factor not within our control to the same extent. Robust optimists may well say that a gap can be narrowed from either side, and that the more commendable operation is to increase our exports. Expansion must always be more attractive than restriction, but how far can we turn this happier theory into fact ? Evidence from the immediate past is scarcely encouraging. The rise in exports value was only 2½ per cent over periods 12 months apart ; in order to have kept the trade gap where it was in early 1954, the rise in exports value would have had to be 14.3 per cent. All this would have had to be achieved as increased volume of exports, for the official index of export prices has not risen since late 1953. It scarcely seems arguable that we sell our goods too cheaply, for most of the practical evidence indicates that competition in many markets is already fierce and that upward tendencies in production costs must lead to reduced sales.

Under present terms of trade, therefore—and they could well worsen—we must speedily sell at least a 12 per cent greater volume of exports to narrow the trade gap to its 1953/54 width. Alternatively, our national consumption of imported goods and materials must be reduced. The two rises in bank rate, and especially the second of 1 per cent, were clearly aimed at reducing internal purchasing power, a repetition of the monetary device by which the present government dealt with the economic crisis that threatened when they first took office. But there is a difference. The patient is not in the same mood. The patient no longer believes there is much wrong with his economic health ; for two or three years it has shown all the signs of a vigour not only restored but increased. He will accept the need for drastic treatment less readily. In addition, he was then a post-election patient and now he is a pre-election patient. If it is far too early to judge the effectiveness of the rise in bank rate, it is certainly clear that the Budget must aim at the same remedy. However popular relief in taxation would be, it could only have the effect of increasing the amount of money and so the demand for imported goods and for goods produced here that might otherwise be sold abroad. Those wh o hope for an 'easy' Budget are ignoring the widening gap in Britain's trade budget ; even an ' as-you-were ' Budget will mean that prospects of narrowing that gap must rest solely upon the change in bank rate.

The plain truth of our economic position as a country is that our standard of living rests upon trade and is not some inherited endowment. We have a huge population for our land-space ; we depend for a majority of essential raw materials upon overseas sources. Nevertheless, we insist upon maintaining or even raising our standard of living. When the terms of trade worsen and prices of various commodities rise, demands for equivalent increases in wages soon follow. Purchasing power is maintained, and there is no ' natural ' check upon the consumption of imported goods or materials ; the home-market remains more attractive to manufacturers than many of the overseas markets. The further effects of increased wages cause new increases in the prices of manufactured goods, and this in turn makes it more difficult to reduce the trading gap by selling more British goods abroad.

Trite though the phrase now is, we live within an inflationary spiral, and we cannot evade recurrent economic crises as the result. If, however, the necessarily firm and unpopular steps are not taken to deal with these crises when they reach their pressure-points, we may not one day be able to look back upon them as a series of temporary ailments or setbacks from which we always managed to recover. It is in this sober and realistic light, and certainly not in a party-political pre-election atmosphere, that the Budget this month should be judged. Mr. Butler's position is not an enviable one. Neither will be the country's if his Budget releases more internal spending power.

Notes & Comments

Salt for the Earth

CONTROVERSY has long centred upon the use of salt as a fertiliser. It in the past twenty years its importance for sugar beet has been recognised, its value for other crops is still under-investigated and under-studied. A major research report recently published in America seems likely to give a fresh stimulus to this subject; Dr. Walter Mortensen, formerly of the University of Wisconsin, has described hundreds of tests on a wide variety of soil types, mainly carried out between 1950 and 1954. Out of 31 crops, 22 showed definite responses to dressings of salt. Unlike much of the salt research of the past, in these tests attention was regularly paid to measuring the sodium content of the soils; one of the unknown factors of chance that has often complicated measurement was therefore isolated.

Commercial Doubts

SODIUM as a plant nutrient exerts a unique influence upon crop growth. It is not essential since all plants can live without it, but when it is not present many plant species seem unable to reach full development. To some extent, but not completely, potassium can exercise the same functions as sodium; conversely, sodium for many plant species can exercise some but not all of the functions of potassium. Responses to salt as a sodium-providing fertiliser depend therefore (a) upon the species of plant studied, (b) upon the amount of potassium supplied, and (c) upon the amount of sodium in the soil. It is increasingly obvious that much former uncertainty about salt's effectiveness was due to muddled appreciation—or a lack of it—of these three influences. How far the use of salt is economically justified depends, of course, upon the size of the crop response. A crop may show a response which is significant so far as research assessment is concerned, but in terms of commercial value the gain in yield may give little or no profit upon the cost of the salt and its application. Thus, the Mortensen report shows average yield gains from salt (at 300 lb. per acre), for wheat, barley, and oats, of 3.3, 6.2, and 2.4 bushels per acre. This scale of response is commercially useful for barley but dubiously so for the other two cereal crops.

A Chance for Britain

FEW countries are better endowed than Britain with massive salt reserves, and it is high time that a special and large-scale research effort was devoted to salt as a fertiliser. There are two new factors that underline the topicality of such a project. First, it now looks as if the deep deposits of potash in Yorkshire will be either impossible or exceedingly costly to exploit. Second, the flame photometer method has made sodium analysis a much less cumbersome task, which means that the accompanying laboratory work can be far less costly and specialised.

Light from Greece

WHILE our recent leader on photochemistry was in the press, a new communication to *Nature* (1955, **175**, 478) revealed some details, as elucidated in Greek research at Piraeus, about the effects of light upon the synthesis of the *gamma*-isomer of benzene hexachloride. In sunlight, the chlorination of benzene in white demijohns yielded a product with 8-10 per cent of the *gamma*-isomer. But using yellow or red demijohns, it was found that the presence of the *gamma*-isomer jumped to 18-20 per cent. Monochromatic light is apparently beneficial to a much greater extent than polychromatic light. Further Greek investigations have shown that 18-20 per cent production can be obtained under more commercial conditions using light from fluorescent lamps and a 35-45°C temperature range. The radiation used gave green and blue light, derived from zinc orthosilicate and calcium tungstate respectively. No doubt a good many 'recipes' for photochemical control of *gamma*-BHC production actually exist, but most of them would

seem to be wrapped in commercial secrecy. Are there several sectors of the light spectrum that can be chosen and selectively given and each with about the same effect? Or does only one range of light in fact promote the optimum yield of the desired isomer? The communication from Greece, though brief enough, tells us a little more about this photochemical reaction than some of its industrial users have been disposed to publish.

Typical Types

AS everybody now knows, the OEEC conference last week at Church House on 'The Functions & Education of the Chemical Engineer in Europe' succeeded in revealing more differences of opinion on the nature of the chemical engineer than were generally believed possible. But gratifying indeed to the student of popular mythology was the regularity with which a national view of the engineer's role conformed in some way with the common conception of that nation's character. To the French the chemical engineer may be a turn-table, a crossroads, but above everything else he is a psychologist and a diplomat. In Italy, on the other hand, he is 'a technician capable of fully understanding a research worker's report, planning industrial plant, budgeting for expenditure, calculating amortisation, and last but not least working out the cost of the final product'. The Germans (shades of Schopenhauer!) find it impossible to believe at all in the existence of the chemical engineer, but the final touch of fantasy was brought to the simultaneous translation system at Church House by Sir Christopher Hinton's description of his ideal requirements—the French for 'spectrum' being *spectre*. After this, Mr. S. A. Gregory must have produced consternation in the interpreters' box when he announced in solemn tones that 'a spectrum is haunting Europe', and perhaps it would have been most satisfactory if the conference had ended there.

River Pollution

THE Banff, Moray and Nairn Water Purification Board is to establish a centralised laboratory for the chemical analysis of water under its control. This follows discussion on the respective merits of sending samples to an analyst or maintaining their own laboratory—the latter project having been at first discouraged by the Department of Health for Scotland. The Board has now decided that their River Inspector can operate a central laboratory and has agreed to equip him at a cost of £246.

The River Lossie is the most heavily polluted in this area, and the removal of tar acids and other toxic compounds is regarded as the main need here. On the Deveron all the authorities involved have schemes on hand which will reduce the pollution to negligible proportions.

A view of part of the I.C.I. (Nobel Division) stand at the Electrical Engineers' Exhibition held at Earl's Court, London, recently. I.C.I., who were taking part in the exhibition for the first time, were demonstrating the uses of silicones in insulation, and among their visitors were members of a Soviet trade delegation

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

Annual General Meeting & Winding Up

FIFTH annual general meeting of the Midlands Society for Analytical Chemistry was held in the Mason Theatre of Birmingham University on Tuesday 22 February. This constituted the 'winding up' meeting of the society.

The chairman, Mr. J. R. Leech, JP, opened the meeting with a brief review of the progress of the society during the past four and a half years. It had begun as the Midlands Analytical Methods Discussion Group in 1950, experts speaking for short periods of time on particular subjects, after which the meetings were thrown open for original contributions, questions and general discussion.

Society Status

By 1952 the membership had grown to such an extent that the name of the group was changed to the Midlands Society for Analytical Chemistry, and with this change of name full lectures gradually replaced the short talk-discussion type of meeting. A two-day symposium was held in 1952, attended by a number of foreign chemists, including some of international distinction in the field of analytical chemistry. The growing esteem of the Midlands Society was considerably enhanced by a second and much larger symposium held in 1954. Mr. Leech said that the society could heartily congratulate itself on the excellence of the work done and on the reputation it had made for itself.

During the 1954-55 session, the hon. secretary's report stated, seven ordinary meetings had been held with an average attendance of nearly 50 persons. In addition, the fourth annual general meeting and a special general meeting were held. A symposium on analytical chemistry was held at the University over the period 25 August to 1 September, 1954. Over 250 delegates attended from the United Kingdom and from overseas, and thanks were due to the University authorities for providing accommodation facilities, to the firms in the Birmingham area who conducted delegates round their works and provided hospitality for them, and to the Symposium Committee who arranged the excellent and successful programme of lectures, exhibitions and social events. The programme of 56 lectures included five by honorary Members of the society; four delivered them in person and one sent a paper which was ably read by Mr. J. E. B. Randles, of Birmingham University.

The attendance book had been signed by everyone attending a meeting to ensure that visitors did not attend on more than the permitted two occasions per session without becoming members. The committee had decided to leave Mr. W. B. Shaw's proposal in abeyance until the financial position was known later in the year. Mr. Shaw had asked the committee to explore the possibility of introducing two classes of membership with a dividing line at 25, the subscription above this age being raised to 10s.

Approval was given so that negotiations could continue with other societies with a view to publishing a joint programme for the 1954-55 session. This had resulted in members being circulated with such a programme in September 1954. The joint Programme Committee, consisting of representatives from the societies taking part, was known as the Midlands Scientific and Technical Societies Programme Committee.

Amalgamation

In July 1954, the committee was approached by the president of the Society for Analytical Chemistry, who proposed that the Midlands Society for Analytical Chemistry should become the Midlands Section of the Society for Analytical Chemistry. The committee had approved that negotiations should continue, and satisfactory conditions under which amalgamation should take place were worked out with representatives from the Society for Analytical Chemistry. At the special general meeting on 14 December, 1954, to which Society for Analytical Chemistry representatives came, it was decided by 35 votes to 5 that the proposed amalgamation should take place on 1 January, 1955. To date 100 members had decided to continue as members of the new section (including 22 who were already members of the Society for Analytical Chemistry), 29 had decided to discontinue, and no replies had been received from 24.

Dr. T. S. West confirmed that Professor

Heyrovsky (Hon. Member) would be lecturing to the section in September 1955. The hon. secretary said that Professor McBryde (Toronto University) would be unable to lecture in the coming October or November as he was leaving the country in September. The meeting asked the hon. secretary to invite Professor McBryde to come either earlier or later in September than Professor Heyrovsky's lecture. The rest of the programme for the next session was being left for the committee of the new section to arrange.

The hon. secretary's report concluded by stating the society's gratitude to the Chemistry Department of the University for facilities granted during the year, and also to Dr. R. Belcher and his staff. Thanks were also due to Joseph Lucas for the loan of the lantern.

Disposition of Funds

In outlining the position of the society's finances the hon. treasurer, Mr. F. C. J. Poulton, said that the estimated credit from the symposium had been exceeded due to the receipt of certain unexpected monies. The cash in hand and balance at the bank would constitute the local hospitality fund of the new section, as agreed when the amalgamation was negotiated with the Society for Analytical Chemistry representatives. The expenses incurred so far during 1955 had been borne by this fund, and this would be adjusted when the Society for Analytical Chemistry annual grant was received. There were 128 paid up members on 31 December, 1954, representing a gain of 16 during the year.

The reports of the hon. secretary and hon. treasurer were adopted unanimously, and the chairman thanked both officers for their services during the past year, and also for Mr. Poulton's services as hon. treasurer of the symposium. Thanks were extended to the two hon. auditors.

In bringing the meeting to a close, the chairman referred to the great amount of work done by the officers and committee during the past four and a half years, and also to the help given by the Analytical School of the University on many occasions. He expressed the hope that the officers and committee of the new section would continue the good work. On behalf of the Midlands Society for Analytical Chemistry, Dr. S. H. Jenkins thanked Mr. Leech for his chairmanship of the society.

Transport by Water

CURRENT expansion programme of Forth Chemicals Ltd., which will more than double its output of monomeric styrene for the plastics industry, has presented a number of engineering problems, among which is the transport of a large steel distillation column, weighing 85 tons, more than 400 miles from London to Grangemouth.

The column measures 140 ft. in length, only 30 ft. less than Nelson's Column in Trafalgar Square, and 14 ft. in diameter. It has been manufactured at the Greenwich Works of Messrs. G. A. Harvey & Company (London) Ltd., who already have considerable experience of moving such heavy items both by road and water. It will be despatched by sea, being made water-tight and towed by tug through the North Sea and up the Firth of Forth.

A novel feature of the operation will be the method of launching. It will be hauled on bogies to a slipway about a quarter of a mile from the workshop and there floated off on the tide. Previous columns have been lowered by cranes. The launching will take place about 20 April, depending upon tidal conditions, which must be carefully studied to enable the operation to succeed.

Documentation Congress

THE provisional programme of the International Congress on Documentation of Applied Chemistry to be held in London in November (see THE CHEMICAL AGE, 1955, **72**, 472) has now been issued. Meetings will be held in the lecture theatre of the Institut Français du Royaume Uni, Queensberry Place, South Kensington, and there will be an exhibition of books and apparatus open to members.

The congress will start with a survey of the international scene, followed by a description of the position in six countries. On the second day attention will be devoted to particular problems, such as language problems, indexing and library and information services. The future will be discussed on the third day, when the congress will close with conclusions and recommendations.

The Export Situation

Circumstances Not so Good as They Appear?

ALTHOUGH considerably above the figures for February 1954, and comparing quite well with those for January 1955, chemical exports for February this year were not all that an anxious economist could desire (see p. 777). In particular, the notable stalwarts such as synthetic dyestuffs, plastics and medicinals all showed a distressing fall from January's figures, the average being kept up, surprisingly, by general chemicals.

Hydrosulphite and aluminium oxide seem chemicals of growing importance; benzole is suffering a lingering death; glycerol continues to fall; and only acetone among the solvents shows signs of improvement.

Exports to the Commonwealth are disappointing, only those to India and Australia showing an increase. The Netherlands Antilles come into the picture again, and Iraq shows a marked increase of trade. Business with the West Indies has fallen right off.

TABLE 1

VALUE OF EXPORTS IN £ : PRINCIPAL COMMODITIES

	Feb. 1955	Jan. 1955	Feb. 1954
Acids, inorganic	59,861	42,959	37,076
Copper sulphate	442,320	361,648	191,468
Sodium hydroxide	477,320	647,910	359,105
Sodium carbonate	296,917	210,322	113,936
Aluminium oxide	115,837	49,114	27,514
Aluminium sulphate	35,553	50,769	18,885
Ammonia	26,938	39,945	27,815
Bismuth compounds	23,392	27,154	24,896
Bleaching powder	41,317	53,959	18,379
Hydrosulphite	75,736	58,485	47,749
Calcium compounds, inorganic	65,810	60,627	66,402
Iron oxides, manufactured	20,822	24,490	11,156
Lead compounds	24,727	37,698	33,745
Magnesium compounds	58,178	52,510	50,723
Nickel salts	52,173	45,556	51,386
Potassium compounds, ex. fertilisers, bromides & iodides	36,228	41,471	25,700
Sodium phosphate	29,797	22,980	14,097
Sodium silicate	32,985	30,431	15,932
Organic acids & derivatives	70,547	69,079	52,786
Glycerol	10,603	22,564	38,179
Ethyl, methyl, etc., alcohols	90,382	130,879	134,012
Acetone	73,996	37,241	51,779
Citric acid	27,998	26,886	18,884
Sulphonamides, unprep.	101,409	99,543	48,317
Dyestuffs intermediates	147,494	140,858	131,666
Total for elements & compounds	**4,694,509**	**4,694,717**	**3,700,495**
Coal tar	69,601	207,832	60,676
Cresylic acids	62,241	57,494	30,199
Creosote oil	58,171	40,385	14,540
Total for tar products	**250,359**	**365,302**	**177,642**
Indigo, synthetic	42,694	52,567	108,570
Total for synthetic dyestuffs	**875,759**	**889,054**	**720,785**
Total for paints, pigments & tannins	**1,641,488**	**1,769,164**	**1,265,668**
Medicinal and pharmaceutical products, total	**2,764,464**	**3,295,517**	**2,353,883**
Essential oils :			
Natural	40,775	42,415	32,176
Synthetic	66,847	98,881	35,982
Flavouring essences	78,703	97,850	64,109
Total for essential oils, perfumes, etc.	**1,879,841**	**1,900,199**	**1,430,945**
Ammonium nitrate	3,969	36,629	39,254
Ammonium sulphate	244,579	557,910	148,383
Total for all fertilisers	**284,872**	**671,810**	**249,873**
Plastics materials, total	**1,741,814**	**2,038,146**	**1,489,199**
Disinfectants, sheep & cattle dips	242,437	128,728	88,120
Insecticides & fungicides	273,708	356,167	220,891
Rodenticides & weedkillers	83,971	73,292	60,290
Lead tetraethyl	960,615	647,403	243,848

TABLE 2

VALUE OF EXPORTS IN £ : PRINCIPAL CUSTOMERS

	Feb. 1955	Jan. 1955	Feb. 1954
Gold Coast	398,808	389,814	290,075
Nigeria	358,513	455,364	263,664
South Africa	821,727	1,195,772	773,415
India	1,272,812	1,088,078	953,862
Pakistan	140,008	436,002	166,581
Singapore	290,417	344,486	224,787
Malaya	201,101	341,233	173,726
Ceylon	260,553	204,506	130,253
Hong Kong	281,464	299,117	245,465
Australia	1,689,281	1,657,519	1,385,334
New Zealand	531,169	726,843	365,004
Canada	483,297	455,282	412,968
Eire	537,797	626,034	539,985
Finland	235,927	282,328	147,962
Sweden	478,486	503,451	420,719
Norway	350,089	356,524	240,884
Denmark	291,731	371,106	329,256
Western Germany	425,205	403,698	281,948
Netherlands	571,988	682,441	546,455
Belgium	453,340	427,195	326,984
France	619,713	547,441	477,516
Switzerland	233,539	198,901	165,348
Italy	519,288	498,793	282,747
Netherlands Antilles	237,891	111,323	62,617
Egypt	391,503	269,020	191,826
Iraq	258,862	148,234	132,540
Burma	255,191	206,512	115,754
US	526,400	702,637	442,064
Argentine	666,390	804,970	173,556
Total value of chemical exports	**18,587,192**	**19,922,490**	**13,696,826**

Du Pont Earnings Rise

But Sales Show a Decrease

SALES by E. I. Du Pont de Nemours & Co. Inc. fell by 3.5 per cent during 1954 compared with the figures in the previous year, says the annual report. For the first three quarters of the year they were steady at a level 8 per cent below the corresponding 1953 figures, but in the last quarter there was a large increase and they were 10 per cent above those of the previous year. The year's total sales amounted to $1,688,000,000, compared with $1,750,000,000.

Earnings for 1954 were $7.33 per common share against $4.94 in 1953, the increase being due primarily to expiration of the 'excess profits' tax. Total earnings came to $344,000,000, including $252,000,000 from Du Pont sources and $92,000,000 from General Motors Corporation dividends. This compares with $236,000,000 for 1953, which included $162,000,000 from Du Pont sources and $74,000,000 from General Motors dividends.

A simplified operating statement shows the disposition of the operating income dollar from Du Pont sources. Of each dollar of operating income, 35.1 cents was paid for materials, services, and miscellaneous items; 28.3 cents was paid for wages and salaries and set aside for employee benefits and for bonues shared by more than 8,100 employees; 15.9 cents was set aside for taxes and re-negotiation; 6.6 cents was set aside for depreciation and obsolescence; 9.2 cents was paid to stockholders as dividends; and 4.9 cents was retained for the needs of the business.

Plant Construction

Products involved in the plant construction programme include man-made fibres, titanium metal, polyester films, plastics, and neoprene synthetic rubber. Two new plants went into operation during the year—one at Circleville, Ohio, for Mylar polyester film and one at Beaumont, Texas, for methionine, a poultry feed supplement. Work was started on two others—at Montagne, Mich., for neoprene, and Antioch, Calif., for tetraethyl lead and Freons.

In the expansion of research facilities, construction was started on three additional laboratory buildings at the experimental station near Wilmington. When these are completed in 1956 there will be at the station more than 1,000 technical people engaged in research. A comparable number of research workers will continue to be located in laboratories at plant sites.

Work at the station has been concerned primarily with long-range research aimed at diversifying the company's business. The fundamental research programme has been a fruitful source of scientific knowledge. It has provided the basis for the development of such major products as nylon and neoprene synthetic rubber and, more recently, for new elastomers, adhesives, foam insulation, and sponge rubber.

Laboratories at plants contribute to new developments and to continual improvement of existing products and processes to meet the keen competition in the chemical industry with respect to both product quality and cost. The company spent $61,000,000 on research last year, exclusive of construction.

Personnel Relations

The report notes the 'harmonious relationships with employees' and pointed out that for the second consecutive year there was no production stoppage due to a labour dispute in any company-operated plant.

It described the company's new safety record, best in its history, as 'the result of excellent co-operation among employees throughout the company.' The frequency rate for lost-time injuries was 0.33 per million man-hours worked, compared with the best previous rate of 0.55 for 1953. Latest available rate for the chemical industry is 4.53 and for all industry, 7.44. The severity rate of injuries was also well down, 77 per cent lower than 1953.

The report notes the company's contributions in educational fields in which over the years it has sponsored a number of programmes in support of scientific education in colleges and universities. In 1954, it appropriated $805,000 for grants for 1955-56.

'In recognition of a growing need for encouragement of science and engineering in colleges and universities, the company has expanded its financial support for such work and extended it to include support for improvement of teaching, now the largest single phase of the programme,' it states.

Italy's Premier Petrochemical Plant

Montecatini's Ferrara Installation

FOLLOWING the second world war Montecatini launched a programme for the manufacture of synthetic resins of the thermoplastic type to meet the growing demands of the Italian market, particularly concerned with polyethylene and polystyrene. So far as polystyrene was concerned there existed a plant for producing the monomer. The raw material common to both plastics was ethylene, produced for the manufacture of styrene from ethanol.

Montecatini's new undertaking had necessarily to be based upon a more economical source of raw material, and it was decided to obtain ethylene from crude oil fractions. Since, at the same time, a demand arose for products derived from propylene the company decided to install a cracking plant for medium distillates, whose design was entrusted to the M. W. Kellogg Co., of New York. This unit was commissioned late in 1954 at Ferrara in Northern Italy, a few miles from the Po estuary.

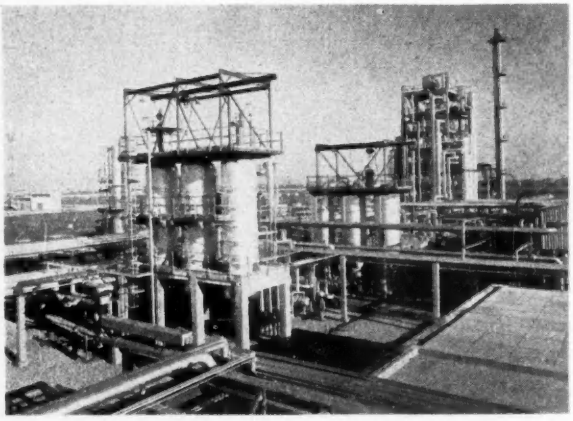
It is worth noting that US producers have, for the most part, concentrated on cracking gaseous feeds—mainly ethane and propane recovered from natural and refinery gases—to meet the mounting domestic ethylene demands. European producers, on the other hand, spurred by a lack of sufficiently large quantities of crackable gases, have found it profitable to prepare ethylene from heavier petroleum fractions.

Kellogg's steam pyrolysis design was developed specifically for such feedstocks, inasmuch as it has superior advantages in high yields, without excess coking. The process employs superheated steam to supply heat for vaporisation of the charge in the case of a liquid feed; reduce the pressure of the charge in the flash drum to a point that permits vaporisation at a relatively low temperature, thus minimising cracking in this step; and reduce the partial pressure of the charge in the high-temperature pyrolysis step, so ensuring a higher rate of cracking of the feed and increased yield of olefines. It has shown a remarkable ability to suppress formation of coke in the furnace—one of the inherent disadvantages of conventional ethane and propane pyrolysis systems. Economy of operation is attained by quenching after pyrolysis in waste heat boilers. The latter provide all the process steam needed for the pyrolysis step.

This new Italian ethylene plant forms part of a major refinery modernisation project undertaken by Kellogg's, which includes a feed preparation section in which the heavy naphtha and gas oil feedstock is distilled from crude oil; a steam pyrolysis section in which the feed is cracked at high temperatures; and a recovery section for separating ethylene and other olefine products.

The cycle of production is an integral one. Crude petroleum arrives in tankers at Porto Marghera, nearly 60 miles from the installation, and is stored at a coastal depot having a capacity of 220,000 bbl. It is conveyed to the works on tank lighters of 7,000

General view of the Ferrara hydrocarbon works of the Montecatini Company



Fractionation columns in the olefine plant at Ferrara

bbl. capacity. The Ferrara works are equipped with a dock for the discharge of tank lighters from which the crude oil is transferred to the plant's tankers.

This crude petroleum is distilled at Ferrara for the preparation of the charge of 4,500 bbl. per day capacity. The unit consists of an evaporating still for the oil, a topping column with two strippers alongside, and a stabiliser for petrol. The bottoms of the topping column are treated in a visbreaking still and fractionated in a subsequent visbreaking column. Of the four principal products obtained by distillation—petrol, naphtha, gas oil and fuel oil—the first item is treated in the sweetening plant and, following lead tetraethyl treatment, placed on the market; and the last is partly utilised at the works for heating purposes.

The intermediate fractions—naphtha and gas oil—form the charge of the cracking installation. The products of cracking are rapidly cooled in the quench boilers, producing steam, and subsequently enter the flash column. This has a lateral stripper and fractionates the liquids into three products: the end-tar, gas oil from the lateral stripper, and petrol of the top cracking. The end-tar is wholly utilised in the works for heating, while the heavy gas oil is employed as a flow accelerator for heavy fractions.

The cracked gas is compressed in the primary depropaniser together with cracked petrol. From the bottom of the column the depropanised petrol is passed on to the stabiliser; at the top of this the fraction is obtained and from the bottom the stabilised petrol is sent to the sweetening plant. The top gases of the depropaniser are taken off, treated with diethanolamine and soda for the removal of sulphur compounds, dried on activated alumina and passed on to the catalyst unit to remove acetylene. With an acetylene content in the fraction of less than 100 ppm. the gases are passed on to the separator unit for procuring the various fractions.

The separator unit is organised as various columns in cascade, all operating at low pressure and at very low temperature. The tail gas is obtained from the top of the first column and consists of a mixture of methane and hydrogen; the second column yields at the top the C_2 fraction, and at the bottom the C_3 fraction. The C_2 fraction is subsequently separated into ethane, 95 per cent ethylene and 99.5 per cent ethylene.

The requisite low temperature for the various column condensers is produced in four cycles by auxiliary refrigerators employing as refrigerating fluids propylene, ethylene and methane, according to the temperature of the condensers. Of this trio, the first two are furnished at the start by the plant itself, while methane comes from outside as natural gas. Particular attention was paid to the design of the low-temperature section of the plant, especially in the choice of materials capable of withstanding low temperatures, and in the preliminary arrangements for drying the crude gas, as well as for inversion and de-icing.

The Ferrara plant is designed for an ultimate maximum capacity of 56,000,000 lb. a year of C_2 and C_3 olefines. The cracked products are utilised as follows. The tail gas is employed in the plant itself for heating.

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More Work with the Polarograph

Papers at Society's Second Meeting

SECOND general meeting of the Polarographic Society was held at 7.30 p.m. on Thursday, 17 February, in the lecture theatre of the Pharmaceutical Society of Great Britain, 17 Bloomsbury Square, London W.C.1, with Mr. W. J. Parker in the chair.

Use of the Polarograph in Fine Chemical Analysis

by J. T. Yardley and A. G. Morris
(*Hopkin & Williams Ltd.*)

Reagent chemical analysis was ultimately concerned with the estimation of very small amounts of substance A in the presence of very large amounts of substance B, and this kind of analysis constituted the main application of the polarograph in the authors' laboratory. As the ratio A : B decreased, it became necessary to employ solutions of increasing concentration. This introduced a variety of problems concerning the major constituent, which might attack the electrode system or be too insoluble to produce a measurable impurity wave.

Nevertheless, the fact that one could often polarograph an aqueous solution of the sample without any addition or other treatment constituted a practical simplicity rarely found in other techniques. With little effort therefore, a rough qualitative and quantitative picture of the sample could be obtained. This was especially useful in exploring new sources of material. The matter of 'blanks' was another great virtue of the technique, for the residual current curve provided a rapid and elegant method of checking the solvent and ancillary reagents.

In the estimation of, for instance, nickel impurities in cobalt salts, polarography was more convenient than absorptiometry when large numbers of samples were dealt with. Furthermore, the polarograph was superior to the flame photometer in determining the alkali or alkaline earth metal content of certain organic samples. The polarograph had also been found useful in the following estimations: lead, copper and zinc in ferrous salts; zinc in alkali cyanides and in high-grade lead; antimony; lead (especially in the range 10-100 ppm.); and the stability of cuprous chloride. The technique also seemed promising in the determination of tellurium in selenium.

From Engineering to Polarography

by C. L. Wilson
(*late of Cambridge Instrument Co. Ltd.*)

In his first encounter with polarography, the author had met an unfortunate dichotomy, in that the chemist understood the chemistry and applications of the polarograph, but knew little of its instrumentation, while the physicist's knowledge lay in the opposite direction.

Most chemical users of the polarograph were completely engrossed in their own problems and seemed to have no wish to impart their knowledge to engineers. This was unfortunate, for engineers could probably make great use of polarography in automatic process control and like problems. By virtue of its automatic recording facility, the average polarograph could often be included in a servo system with but little modification. As in most applications of electrochemical instrumentation to this kind of problem, the main difficulty lay in the electrode system.

To illustrate his point of view, the author cited three possible engineering problems, which might be satisfactorily solved by polarography. In certain plating baths, it was necessary to maintain a constant concentration of zinc by periodic additions of a concentrated solution of a zinc salt; these additions might well be controlled by means of a polarographically operated solenoid valve. The control of metals in industrial effluents required the sort of continuous indication which the polarograph could afford. The corrosion of pipes might be detectable polarographically by analysis of soil samples taken from the vicinity of the pipe. A recent successful engineering application of the polarograph concerned the control of dissolved oxygen in boiler feed water.

Polarography of Aromatic Nitro Compounds

by Dr. J. G. Waller
(*National Benzole Co. Ltd.*)

In the normal four electron reduction of nitrobenzene, the first two stages appeared to be reversible and were followed by a third, probably irreversible, stage which seemed to involve the loss of a molecule of water. In

the last two stages, nitrosobenzene was reversibly reduced to phenyl-hydroxylamine. At high and low *p*H values, the reduction of *o*- and *p*-nitrophenols required six electrons, while four electrons were required at *p*H 5. Brdicka had explained this in terms of an acid-base catalysed rearrangement of the *o*- and *p*-hydroxyphenylhydroxylamines to the corresponding quinone imines.

A similar explanation was applied to the reduction *o*- and *p*-dinitrobenzenes. In this case, a four electron wave was followed by a second wave, which involved six electrons in neutral solution, but eight electrons at high or low *p*H values. Possible intermediates were the nitroanilines, which reduced in single six electron steps at all *p*H values; the rearrangement of nitrosoanilein appeared to be concerned. Both the amino and hydroxylamino substituents promoted the reduction of nitro to amino. Substitution of the nitroaniline amino group caused the nitro reduction to stop short at the hydroxylamino stage, as with nitrobenzene itself. The reduction of the nitrobenzoic acids and their methyl esters was also discussed.

Increasing Losses

DESPITE marked increases of $9,700,000 in net sales and $1,800,000 in operating profit, heavily increased provision for interest charges, depreciation and amortisation resulted in a jump from $1,200,000 to $5,200,000 in the net loss of Canadian Chemical & Cellulose Co. Ltd. in 1954. Net loss in 1952 was $2,100,000. Consolidated, cumulative deficit now stands at $9,900,000.

This is disclosed in the company's annual report, which shows net sales at $28,488,237 compared with $18,800,000 in 1953. Cost of goods and general expenses jumped to more than $24,000,000 from $16,100,000, but left operating profit at nearly $4,500,000 compared with $2,700,000. Interest on mortgage bonds rose by $1,700,000 to $2,800,000 and interest on $6,000,000 of short-term notes held by the company's bankers amounted to more than $1,000,000 compared with $166,249 in the previous year. Provision for depreciation and amortisation was increased to $5,200,000 from $2,300,000.

The report notes that 'the net results obtained in this first full year of combined operations of the Edmonton plant and the expanded Prince Rupert plant will have been realised despite the continuing low level of activity in the textile industry, and a highly competitive condition in markets for industrial chemicals.'

During the year net additions to fixed assets amounted to $2,765,259, while sinking fund requirements on funded debt were $1,905,000. Funds for these purposes, as well as to provide for an increase in working capital, were obtained by the issuance of an additional $6,000,000 of short-term notes.

Montecatini

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etc. The C_4 fraction is stored for the time being and in due course will be separated into its components, butadiene, butylenes and butane (the first fraction destined for chemical applications). Ethane is transferred to an auxiliary cracking unit, designed by Montecatini, to obtain a larger amount of ethylene (this unit is scheduled to go on stream this spring). The C_3 fraction obtained from the olefine plant, with a propylene content of 93 per cent, is intended partly for feeding the unit for the production of isopropanol obtained by hydration, to be subsequently converted to acetone; the rest will furnish the raw material for the Oxo synthesis installation for the production of higher alcohols for use in the manufacture of plasticisers. A suitable propylene-propane rectification unit provides for the recovery of the bottoms, the propylene from the top being recycled and propane from the bottom sold as liquid gas for heating.

The 95 per cent ethylene feeds sundry plant for the production of dichloroethane and dibromoethane by synthesis from the respective halogens, ethyl chloride by synthesis with anhydrous hydrochloric acid, monomer styrene by alkylation of benzene and subsequent dehydrogenation by catalysis, and ethylene oxide for conversion into glycols. Part of the latter are to be used in the production of Terylene. Petrol from the cracking process is treated in the same way as the primary product.

The entire Ferrara works is scheduled to go on stream this summer. Output figures of the principal olefine derivatives are: polyethylene 13,200,000 lb.; polystyrene 17,600,000 lb.; and acetone 12,000,000 lb. a year.

Chemical Engineers in Europe

Final Sessions of OEEC London Conference

THE Organisation for European Economic Co-operation Mission which visited the US to study chemical equipment published a report in 1952 which stressed the need in Europe for drawing the attention of governments and industry to the necessity for chemical engineering education and practice and the value of chemical engineering research.

As a consequence of these recommendations, an international conference on 'The Functions and Education of the Chemical Engineer in Europe' was held in London on 21-23 March by the OEEC, organised by the British Institution of Chemical Engineers in co-operation with the Department of Scientific and Industrial Research. The objects of the conference were to draw attention to: (1) The necessity for more chemical engineers and more schools of chemical engineering, (2) the necessity for more financial aid for chemical engineering research, and (3) the necessity for a more general recognition of the part that chemical engineering is playing in modern industry.

In our issue of 26 March we published a report of the first three sessions of the conference and following is our report for the remaining three:

THE third session (reported last week) had been concerned with the presentation of model courses of study for a primary degree in chemical engineering. At the fourth session, held in the afternoon of Tuesday, 22 March, attention was concentrated on other educational schemes, particularly the post-graduate course, the part-time course and the examination of the Institution of Chemical Engineers.

The first paper, *Chemical Engineering in Sweden at University Level*, was by **C. J. Borelius,** Svenska Skifferolje Aktibolaget, Narkes Kvarntorp, Sweden. The trend in Sweden, as in many other European countries, is now to develop the actual chemical engineering education while at the same time keeping the most valuable parts of the training in chemistry. The graduate chemical engineers already employed in industry feel a great need for more modern chemical engineering education, and for that reason the Association of Swedish Engineers has in recent years given courses in various chemical engineering subjects, such as distillation and evaporation, separation, materials of construction, etc. In 1953 the association set up an education committee to study the problem of the professorships in chemical engineering unit operations and other questions concerning chemical engineering education. The committee issued its report last autumn.

There is a great lack of chemical equipment designers, and even if Swedish chemical engineers were to receive an education similar to that of their American colleagues, there would still be too great a gap between them and the mechanical engineers who carry out the chemical equipment design. Something in between is needed, which the committee has called a 'chemical-mechanical' engineer. The committee proposes that during his first two years at college, the 'chemical-mechanical' student will spend most of his time at the department of mechanical engineering and during his third and fourth years he will take courses in physical chemistry, industrial chemistry, heat technology and chemical engineering unit operations.

In a paper on *The Co-ordination and Development of Postgraduate & Undergraduate Courses in Chemical Engineering*, **Professor M. B. Donald,** of London University, and **Professor J. M. Coulson,** of Durham University, described some of the advantages of the post-graduate course. One of these is the scope they offer for flexibility. The undergraduate courses are all rather overloaded and tend to be too full of material with little time for reflection. It is dangerous to tackle technology without a basic knowledge of engineering science. The final development of the techniques of chemical engineering require a combination of chemistry, chemical engineering and mechanical engineering, and it is a great asset to have several men trained in any two of these fields.

A paper on *Process Control in a Chemical Engineering Course* was given by **Professor S. G. Terjesen,** Institut for Kjemiteknikk,

Norges Tekniske Hogskole, Trondheim, Norway. The paper gave a proposal for an undergraduate course in process control, under the following headings: the elements of control theory, measuring elements, control equipment, application, problem classes, laboratory work and instrumentation in plant design. In addition to its direct influence process control serves an important educational purpose. Intelligent consideration of instrumentation and automatic control presupposes a thorough knowledge of the plant and process and forces the student to look at his project more from an operational point of view.

A survey of the 'alternative avenue' into chemical engineering was gievn by **Mr. R. W. Blount,** Staff Inspector for Chemical and Metallurgical Education, Ministry of Education, whose paper was called *The Part-time Course in Chemical Engineering.* Part-time courses of further education occupy an established position in the educational system of Great Britain and a substantial proportion of the professionally qualified engineers in the country obtain their education in this way, concurrently with their practical training. At the beginning of the century the periods of study were mainly in the evening, but it is now an accepted practice for employers to arrange for their young employees to spend one day each week at a technical college engaged on an organised course of study. The 'sandwich' system is a further development under which the young employee attends the college for periods of full-time education which alternate with periods in his employer's works.

Mr. Blount said that part-time day courses were now taking the place of evening classes, and at present there were 300,000 young people being freed by their employers on one or two days a week. The chemical engineering scheme, however, had not received the support from industry that other branches of engineering had, and the numbers were lamentably small. Only three Higher National Certificates in chemical engineering were awarded in the 1952-53 session and five in 1954.

Mr. G. U. Hopton, senior research chemist of the North Thames Gas Board, gave a paper on *The Examination of the Institution of Chemical Engineers.* The revised examination which comes into force next year is divided into three parts. The first consists of four papers on the principles of chemistry and physics and elements of engineering, and the second of four papers on the theory and practice of chemical engineering. The third is the Home Paper, a problem in chemical engineering plant design which the candidate attempts in his own time over a period of two months. These three parts qualify candidates for admission as students, graduates and associate members respectively.

In the discussion which followed the papers there were contributions from a trade unionist and a chemical engineering student. The trade unionist, **Mr. E. Higgins,** of the Transport and General Workers' Union, said that as a member of the management the chemical engineer should possess not only knowledge but an understanding of human problems. He needed training in industrial leadership which should be given at technical college or university and should be a continuous process. It might be said that the chemical engineer had more than enough on his plate already—which was quite true—but without this training he would be incomplete.

Mr. F. A. Watson pointed out that according to the list of qualifications presented by various speakers the chemical engineer needed to be a paragon. Provided he had the fundamentals to work on, his ability would grow, and the main requirement was knowledge which was basic to all the sciences he was likely to come in contact with. Mr. Watson suggested that rather more emphasis might be put on the need for mathematics.

Mr. J. K. A. Parkin said that the examination of the Institution of Chemical Engineers provided a model course such as they had been discussing in the previous session. The revision of the examination should be a pointer to the recognition of 'what we call a chemical engineer.'

A third-year student taking his final degree at a technical college, **Mr. D. Scott,** described himself as 'part of the football you have been kicking about.' He described the course he was taking—a two-year course in chemistry and engineering and one year in chemical engineering subjects—and suggested that the final year should be extended to two.

The chairman, **Professor F. H. Garner,** of Birmingham University, said that the discussion to some extent provided a commentary on the paper given by Sir Christopher Hinton the previous day. There were disadvantages in the postgraduate course, he pointed out,

and the real alternative to a degree in pure science, plus a year's postgraduate chemical engineering course, was to lengthen the undergraduate chemical engineering course. This, however, could not be done at present, in view of the shortage of chemical engineering students.

Professor Garner suggested that the difference between part-time and university students seemed to lie in their methods of approach. The university student had a more theoretical approach than the part-time student, who was already engaged in industry.

THE fifth session took place on Wednesday morning and its subject was 'The Practical Training of the Chemical Engineer Before and After Entry into Industry.' The first paper was *The Practical Training of the Chemical Engineer on Entry into Industry* and it was presented by **Mr. F. H. Pugh.**

In his paper Mr. Pugh gives a description of the methods employed in the training of newly engaged graduates as chemical engineers by the Bataafsche Petroleum Maatschappij in the Netherlands. This firm, which is the European company of the Royal Dutch/Shell Group of companies, refines oil and manufactures a wide range of petrochemicals. It is a large company and needs chemical engineers for many purposes. Chemists; physicists; physical, mechanical, electrical and aeronautical engineers often have to be transformed into chemical engineers. The young graduate chemical engineer also has to be given some training.

After outlining the company's training organisation and the training facilities available, the paper describes in some detail four types of courses. The first of these is a basic chemical engineer's course for newly engaged graduates destined to assist in refinery operation, and the training period in refineries or chemical plants is kept as short as possible, the average duration being approximately one year. To compensate for the short initial period, refresher courses are held after three or four years' service. The course is broken up into a general introductory course of approximately 11 weeks at Amsterdam, and roughly 10 months at Pernis. Here the young graduate spends four months on shift in distilling plants, one month sight-seeing around all of the other processing units of the refinery, four months specialisation with responsibility as shift- and day-foreman, and one month in the engineering and other departments. During the Pernis period a two weeks' course on measurement and controls is taken at Delft.

Other courses are a basic course for newly engaged graduates for the chemical industry department; a course for graduates destined to work on the development of oil processes, chemicals processes or design; and specialist training courses. These latter last up to 80 weeks and are for the training of corrosion engineers, process control engineers, and instrumentation engineers.

The second paper was *Practical Training of the Chemical Engineer Before & After Entry into Industry* by **J. P. V. Woolam** and **J. M. Solbett** of Simon-Carves Ltd., Stockport, Lancs. It discusses the relative merits of the means for the practical training of full-time chemical engineering students during a pre-University year in industry and during the summer vacations. A summary is given of the views of a number of prominent teachers.

For post-graduate training the authors urge the acceptance of a two-year apprenticeship scheme as a necessary qualification for professional recognition. A post-graduate apprenticeship scheme applied to a chemical plant contracting company is described. The training includes progressive supervised work in the drawing office, on plant operation, plant construction and commissioning and in the design office. The emphasis, the authors state, must be on constant guidance of the trainee by a senior chemical engineer and the object of the apprenticeship scheme is to bridge, at an early stage, the gap between the outlook of the new graduate and that of the great body of established practical men engaged in industrial supervision.

Mr. D. Morten, manager of the training department of Shell Refining and Marketing Co. Ltd., presented a paper *Vacational Training for Chemical Engineers*, in which he gives details of a proven scheme for the vacational training of technical undergraduates, especially chemical engineers, in the British petroleum refining industry. The paper lays considerable emphasis on the part that these courses can play in the development of the student not only from the technical but from the human point of view, and the advantages gained by tutored courses working on selected practical works problems proposed by the chief technologist.

Introducing his paper, Mr. Morten said that the great preponderance of technical men were employed on the day to day operation of plant. He and his colleagues felt that this was a worthwhile career for graduates and tried to encourage the students who came to them during their long vacations to take up such work. They were careful never to have any student spend two of his vacations in the one department so that he would gain as wide experience as possible.

The final paper of the session was *The Foundation & Development of the International Association for the Exchange of Students for Technical Experience* by **Mr. J. Newby,** secretary of IAESTE. This paper traces the development of the Association during the past six years and stresses the advantages obtained by the students and industries participating. The type of training for students of chemical engineering is referred to and typical examples of training offers available in various industries in Great Britain and abroad are quoted. In 1954, 287 chemical engineering students went abroad for their holidays from 16 countries.

Opening the discussion, **Mr. E. S. Sellers** of the Department of Chemical Engineering, Cambridge, said that everyone agreed regarding the need for training but there was considerable disagreement regarding the meaning of terms. When the industrialists talked about fundamental principles, teachers were struck by the feeling that they just didn't know the meaning of the phrase. He could not believe that the fundamentals could not be learned in three years; when he heard that it took seven years to learn them at Delft he was amazed. There were people who said that a longer course was necessary. If this was agreed upon only the brighter students should take it. It was more important to keep the student thinking than just to keep him busy.

After briefly describing the course of training at the Massachusetts College of Technology, Mr. Sellers said that it seemed to him that a modification might well be applied in this country. The first graduates from the Department of Chemical Engineering at Cambridge had gone out in 1950 and since then about 70 students had graduated. Close contact had been kept with these and certain conclusions had been reached from studying their progress. One of these was that the young graduates should be put to work under supervision so that they could consolidate their learning. Another conclusion was that it took a very good industrial training course not to spoil a good man.

Mr. Sellers said that he believed that every man going into a works, either as a chemist or a chemical engineer, should go directly on to plant operation under supervision; they should go on to the shift. Once they were accepting a cup of tea from the boilerman's can he felt they were beginning to get places.

Dr. D. Clayton of I.C.I., Billingham, said that they must not make any training scheme too rigid. The Institution should make up its mind merely as to the minimum training requirements needed. He was opposed to a two-year apprenticeship following graduation.

Professor G. G. Lamb, representing the American Institute of Chemical Engineering, emphasised the need for training the chemical engineer to include the dollar sign in all his equations. The Americans stressed the costs of production far more than was the custom in Europe. Before the last war all information regarding costs of production were guarded zealously by the American manufacturer. When a national emergency arose, however, a great deal of what had always been looked upon as highly confidential information was collected and published. He thought that a somewhat similar situation existed in Europe today and that under the auspices of the OEEC, the publishing of similar information for Europe was called for.

Dr. E. H. T. Hoblyn, director of the British Chemical Plant Manufacturers' Association, said that British chemical plant manufacturers had always taken a great interest in education. He thought courses of training must be planned carefully and supervised, and if the universities could play a part in this so much the better. The courses should smooth down the academic edges and help the student to fit into his part of the whole plan. There was more to training courses than the mere gaining of practical experience. The student must not only get close to the job but must also get close to the man. He must learn how to understand men and how to get along with them.

One of the big advantages of practical training was that it brought the young engineer into close contact with accident and fire prevention schemes. Only on the job could the awareness of the need for safety precau-

tions be brought home to him. It must not be learned the hard way for too often this was the fatal way.

The plant manufacturing industry was anxious to do all it could to encourage the training of chemical engineers because it was going to have increasing need for them.

Mr. F. E. Warner, joint honorary secretary of the Institution of Chemical Engineers, said that they had had a very gratifying coming together of views and he felt that a great debt was owed to the academic people for their help. Much of the progress was due to the personal contact made during informal moments and to the lead given the rest by the academic people.

Mr. Warner deprecated the mutual distrust which existed between the chemical plant manufacturer and the plant operator for he believed a great deal could be learned about the design of a plant by starting it up. He felt that the chemical industry could learn from the example of the friendly co-operation existing between the manufacturer of petroleum equipment and the oil refining industry. As things were now the designer of chemical plant was not being given a chance to gain the experience of plant operation which was necessary for progress. A bridge would have to be built so that the men in the drawing office and research laboratory could get out into the process.

Mr. S. A. Gregory said that physical measurements played a very large part in the vacation courses given to university students and while some were simple some were very complex indeed, e.g. the measurement of what went on in a fluidised bed. He felt that some research in the field of physical measurements was needed.

Mr. R. G. Browning said that every year there was more and more to learn and the student was kept very busy for a long period with his University course, training during the long vacation, his National Service and a two years acclimatisation when he went into industry. It was a little late in life for the student to start earning good money when it was remembered that retiring ages were now rigidly set and that it was difficult for a man over 45 to find a new job. He interviewed many young students each year and he found that the length of a course and its fullness was a deterrent. He found that many young men were being put off chemical engineering by these factors.

Mr. W. G. Daroux, of Courtaulds Ltd., believed that the importance of the drawing office was being overemphasised in the training of chemical engineers. He would like to see a greater emphasis placed on the rough sketch with the more detailed drawings being left to the skilled drawing office personnel.

Professor P. D. Ritchie, of Glasgow Technical College, said that there were even more ways of training a chemical engineer than there were ways of defining one. At his college they attempted to produce two general types of chemical engineer—one with a chemical bias and one with an engineering bias. In the final year of the four year course the student was given a research problem on the works scale in collaboration with I.C.I.'s factory at Ardeer.

M. Jean Gerard, of the Société de Chimie Industrielle, Paris, said that during the past few days it had been revealed that the chemical engineer had an important new role to fill. The US, the UK and Commonwealth were in the forefront of this new field. American ideas could not always be applied on the European continent owing to economic and other differences and as a result of this situation the European Federation of Chemical Engineering had been formed and would hold its first congress at Frankfurt, commencing on 14 May. As official delegate to the conference from the European Federation he invited those present to attend.

Summing up, the chairman, **Professor M. Letort** (Directeur de l'Ecole Nationale Superieure des Industries Chimiques, Nancy) said that industry was now conscious of its social rôle—conscious that it must work with the universities and not against them. It was important that the industrial stage of the chemical engineer's training should not be a second military training; it must not destroy his initiative.

THE sixth and final session took place in the afternoon and the chairman was once again Sir Harold Hartley. The subject was *Chemical Engineering Research: its Future Needs and Scope.* The first paper was presented by **Professor J. Cathala.** Directeur de l'Institut du Genie Chimique, Toulouse, and was entitled *Research in Chemical Engineering.*

Chemical engineering has established itself as a true science now that the importance of the concept of the 'fundamental operation' has been acknowledged. The detailed study of major fundamental operations has

stimulated a considerable amount of work during the last 30 years and the accelerating development of the chemical industry is calling for new research every day.

The growing number of fundamental operations being used in chemical engineering can be classified in three main sections: mechanical operations, process of physical change and process of chemical change. Methods of investigation must include calculation by graphs, dimensional analysis, statistical analysis, etc., but some research is necessary to determine the value of these methods. The solution of many problems in chemical engineering is made difficult by the almost total absence of numerical data on the properties of the substances being dealt with. It is essential that approximate methods for estimating these missing data be developed.

Problems can only be resolved by co-operation between several specialists and it is equally essential that co-operation be organised between teams of investigators. Both teaching establishments and industry must work together for the common good.

In his paper, *Organisation of Research in the Process Technology Field in Germany*, **Dr. H. Miessner,** Farbenfabriken Bayer AG, explains that chemical and process engineering research in Germany is carried out in the institutes of the Technische Hochschule and universities as well as in industry. Since 1932, leaders of industrial and academic research have joined together in the Fachgruppe Verfahrenstechnik of the Verein Deutscher Ingenieure in order to exchange information and to plan future research. Corresponding to the broad scientific basis of chemical process engineering, chemists, physicists, physical chemists and engineers are represented on the 13 technical panels of the group.

The Process and Chemical Engineering Research Association, which erected its first research institute at Aachen in 1952, works in close association with the Fachgruppe Verfahrenstechnik. Further institutes are planned.

Mr. A. S. White, head of the Chemical Engineering Division, Atomic Energy Research Establishment, outlines three main needs in a paper entitled *Chemical Engineering Research: its Future Needs & Scope in Process Development.* These are: physical and chemical data on the materials used in the process; design methods for full scale plant; and the development or adaptation of ancillary plant items. Much of this information is not available in the literature.

Introducing his paper, Mr. White said that a university was limited in its research function in so far as it could not afford the equipment or the time for large scale or long-term research projects.

Professor S. Kiesskalt, Director of Forchungs Gesellschaft für Verfahrenstechnik of the Rhine-Westphalian Technische Hochschule, presented a paper, *Future Needs of Chemical Engineering Research,* in which he stated that developments in all fields of chemical technology are towards continuous processes with higher pressures, higher temperatures and lower flow densities.

Discussing his paper, Professor Kiesskalt said that during the past few days they had seen that they did not even known where they were at the present so to prophesy about the future was very difficult. He had been forbidden to work on atomic energy so knew little about the processes involved but as soon as the situation changed he would alter his ways.

The subject of **Professor P. M. Heertjes'** paper was *Some Remarks on the Scope & Future Research in Chemical Engineering.* Professor Heertjes, of the University of Delft, claims that the first aim of research is the increase of knowledge so that a direct calculation of the dimensions of a chemical plant will be possible. Three types of research are needed—fundamental research, equipment research and development. Great attention to the first of these will be needed in the future and better equipped laboratories and better-paid staff are needed. He advocates long term planning and greater freedom—especially in industry—for the research worker.

In his remarks Professor Heertjes said that he did not think the line of demarcation between the fields of research and the places where they should be carried out should be too sharp. He felt, however, that the mental climate at Universities was best suited for carrying out fundamental research. He emphasised that team work was an absolute necessity in many fields.

The situation with regard to salaries of teachers was apparently the same in all countries—it was alarming. He would not advocate that the university worker be paid as well as the man in industry but big increases were needed. Finally he said that apparatus

on which research was being carried out was often so large that it hindered rather than helped the worker. He felt that research plant should be built as small as possible.

The title of the final paper was *The Scope of Research in a University Chemical Engineering Department* and the author was **Professor D. M. Newitt,** Courtaulds Professor of Chemical Engineering at the Imperial College of Science and Technology, London. The use of models based upon data obtained from large scale plant affords the student an opportunity of becoming acquainted with industrial operations and processes, and of developing procedures for dealing with the large number of variables which are involved therein. Dimensional analyses and the use of statistical methods are important.

Professor Newitt introduced his paper by saying that the best way to make a student think was to give him an original problem to solve. In Holland they had a very sensible plan—a five year course, the last two years of which were devoted to research. The problems of chemical engineering differed from those of pure science because of the occurrence of very many variables.

The discussion period was opened by **Mr. H. W. Cremer** who said that more than 40 years of his professional life had been devoted to chemical engineering, during which time he had never doubted that a human being could be produced who could be denoted a chemical engineer. They had heard of the value of a team of chemists, physicists, engineers, etc. He would be the last to deny the value of teamwork but many firms could not afford teams. He did not believe that if he were jack of all trades the chemical engineer need be master of none. Although chemical engineering involved a number of sciences and unnatural philosophies, the training of the chemical engineer fitted him to face all his problems with an open mind. Chemical engineering was important in the evolution of science.

A practising chemical engineer knew from experience that if he calculated dimensions of a chemical plant from data given in the literature he would frequently be wrong but he didn't always know why he had been wrong. It was highly essential, therefore, that there be the closest association between academic and industrial research.

Dr. F. A. Freeth said that he had written an article about 30 years ago which had got him into a certain amount of trouble. Its subject was the educational value of failure. All he wanted to say now was that it sometimes paid to give the right young man something really desperate to do. As far as research was concerned one should think in terms of thousands of pounds.

Dr. C. Clayton of I.C.I. said that the universities should concentrate on basic and fundamental research. The *ad hoc* work should be done by the technical colleges and industry. He thought that industry should offer its basic problems to the universities. He was in favour of sponsored research but thought it should be done at the right place, not at the universities. He regretted that Britain did not have sufficient independent research institutions.

Universities should have removed from them the work which involved elaborate and expensive apparatus and long and extensive research. That sort of work should be done by a British Chemical Engineering Research Establishment. It should be made clear that an establishment of this nature was urgently needed even if it was financially impossible at the moment.

Summing up, **Sir Harold Hartley** said that it had been most heartening to hear about the research institution at Aachen. It appeared to him that that was just about what they would like to have in Britain.

They had reviewed the fields in which research was, possibly, most needed. There was undoubtedly a great need for the collection of data on the new materials coming into use and it appeared to him that this was one field where greater co-operation was possible. All countries were doing chemical engineering research and there could be a big saving of time, effort and cost if information were pooled.

Before calling the three day conference to a close Sir Harold said that with one partial exception there had been general agreement as to the conception of chemical engineering as being the fourth engineering technology. He was sure that no one fully realised the degree of unanimity that existed.

Mentioning the fact that the Germans did not entirely agree with the British approach, Sir Harold said that he greatly admired their *verfahrens-ingenieur* and paid tribute to the accomplishments of German chemical engineering. Adaptability and flexibility was the great strength of chemical engineering and it was right that training should vary somewhat between different companies.

Indian Newsletter

FROM OUR OWN CORRESPONDENT

ANOTHER method for the determination of uranium in high-grade ores, alloys and uranyl compounds has been developed at the Chemistry Division of the Indian Atomic Energy Commission, Bombay. The method depends upon the properties of complexone II to form a stable complex with interfering ions in presence of ammonium hydrogen phosphate at *p*H 5. A quantitative precipitation of the uranyl radical as $UO_2NH_4PO_4$ is effected and final ignition at 1,000°C. yields $(UO_2)_2P_2O_7$. In this method, precipitation can be carried out in presence of sulphuric and phosphoric acids and the adsorption and coprecipitation of radicals brought down by ammonia is avoided. The voluminous nature of the precipitate allows use of a very small quantity of the material for the determination. It has been shown that in presence of several elements including rare earths, results accurate to 0.16 to 0.3 U_3O_8 can be obtained. The only serious interference is given by beryllium and titanium, although small amounts of titanium can be complexed with hydrogen peroxide before the addition of reagents.

A new organic reagent named morellin (see THE CHEMICAL AGE, 1955, **72**, 585) which is a plant pigment and an antibiotic, has been used in the spectrophotometric estimation of micro-quantities of thorium. Thorium was found to combine with four molecules of morellin, to give an orange-coloured complex which is stable between *p*H 5 and 7. It has an absorption maximum at 515 mμ and obeys Beer's law closely. Some ions, notably iron and uranium, cause interference and estimation of thorium in monazite should be made after removal of iron and phosphate. Thorium forms three complexes with *p*-toluic acid at different hydrogen ion concentrations. The estimation of thorium in monazite can be done with the complex formed between *p*H 2.6 and 2.8. The separation of thorium from cerium and rare earths and its estimation have been attempted with another organic reagent, *p*-chlorophenoxyacetic acid.

* * *

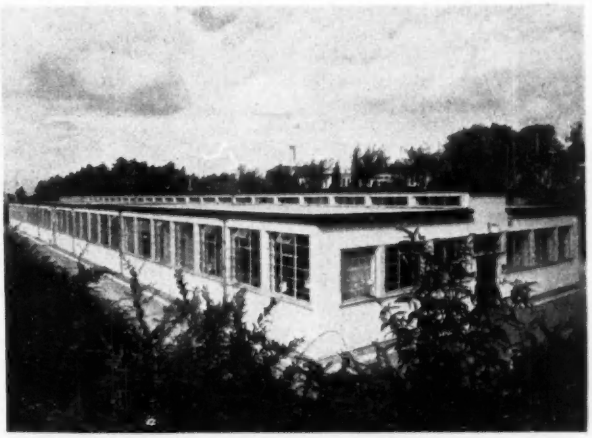
The Government of India have completed a scheme for the marketing of soda ash and caustic soda in India through a system of controlled monopoly. The Government will give Tatas and Imperial Chemical Industries the exclusive right to market the chemicals at pre-determined prices and will pay them a fixed remuneration for their work. The Government will import the chemicals through these two firms from the cheapest sources. In fact, the selection of the sources of supply will be done by the Government, which will enter into contracts with them in consultation with and on behalf of the released firms.

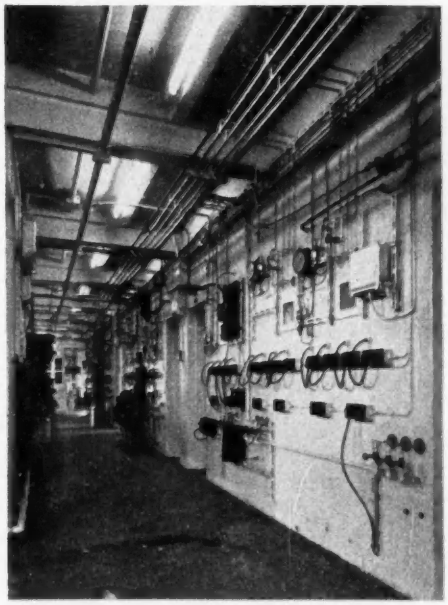
* * *

The Government of India have accepted the Indian Tariff Commission's recommendations that the dyestuffs industry be granted protection for a period of ten years subject to periodical reviews. In particular the Government have asked Atul Products Ltd. and other firms to submit revised programmes incorporating details on finance, phases of programmes and technical assistance available for the manufacture of dyes and intermediates in India. It may be remembered that Atul Products Ltd. have entered into an agreement (THE CHEMICAL AGE 1954, **70**, 1347) with Imperial Chemical Industries (India) Ltd., for the manufacture of dyes. The Government have also drawn to the attention of industry that it should set aside substantial amounts for research and employ adequately trained research workers. The other recommendations of the Commission accepted by the Government relate to the conversion of the present duty of 12 per cent *ad valorem* on fast colour salts, rapid fast dyes and solubilised vat dyes to a protective duty, the raising of the duty on congo red, azo dyes and sulphur black to 20 per cent and reduction of the duty on specified intermediates to 10 per cent.

* * *

A new unit sponsored by the Silk & Art Silk Mills Association in combination with an Italian firm will commence production of rayon and staple fibre in about two years. The location of the plant is not yet decided although the Italian experts have selected two sites in Bombay and three in Surat. The aggregate capital outlay will be about Rs.60,000,000 (£4,500,000). The installed capacity will be 8,000,000 lb. of rayon yarn and an equal quantity of staple fibre per annum.





A general view of the new laboratory block at Epsom, and (below) the interior of the high-pressure laboratory

Pre-Cast Concrete for DCL

MANY industrialists have been using non-traditional constructions for some years. Very shortly after the war ended the Distillers Company embarked upon a long term programme to extend the facilities at its research department at Epsom, and had to decide what types of permanent buildings to erect. Pre-cast reinforced concrete construction presented many attractive features, and the system designed by Orlit Ltd., 18 Buckingham Gate, S.W.1, was chosen as being suitable for the proposed laboratories, offices and workshops. There is a saving not only of scarce materials, but the erection time is cut by about 50 per cent compared with traditional building, and about 70 per cent of the labour employed can be unskilled.

Since 1946 several single storey buildings have been erected, including four chemical laboratories, a large biochemical laboratory, a high pressure laboratory, a library, a mess room, a workshop and a lavatory block; a two storey office block, L-shaped, has recently been completed. All are in Orlit pre-cast concrete construction.

The large biochemical laboratory is interesting. To provide the required floor area there are two 24 ft. standard Orlit bays divided by an 8 ft. central corridor, making a building 56 ft. wide and 250 ft. long. Another laboratory of similar size and construction is planned and will be started very shortly.

Unbranded Drug Prices 'Not Excessive'

The Ministry of Health, in a letter to the Association of the British Pharmaceutical Industry, states that results of an investigation into costs 'do not suggest that the general level of prices which manufacturers receive for unbranded standard drugs and preparations is excessive.' The investigation was carried out into the margin of profit, turnover and capital employed of a sample of 19 companies with an annual turnover of £24,000,000. Accounts for three successive years were examined.

Terylene Comes Out

MORE than 130 individual manufacturers exhibited at the 1955 Terylene Show which was held at Hutchinson House, London W.1, from 29 March to 1 April. The show illustrated the great progress which has been made in developing uses of this, the first all-British synthetic fibre.

Fabrics on show included voiles, satins, brocades, velvets, marquisettes, fur fabrics and Terylene/wool suitings and skirtings. Skirts, trousers, socks, ties, lingerie, foundation garments and other items of both men's and women's wear were displayed. A display of 30 especially commissioned fabrics included Terylene furnishing fabrics which can be expected on the market soon.

Four fashion shows were staged daily, the models being commissioned from the Haute Couture of London, Paris, Rome, Florence and Dublin. The show was organised by Lady Ashton, fashion adviser to the Terylene Council.

The exhibition was opened by the President of the Board of Trade, Mr. Peter Thorneycroft. Welcoming him the chairman of I.C.I., Dr. Alexander Fleck, said his company believed that they were taking part in an early chapter of what would prove to be a great British success story. They were confident that in due course, Terylene would be able to clothe the nation's export figures with credit. The exhibition was in the nature of Terylene's coming-out party.

Synthetic Rubber Prices

THE sale of the US Government-owned synthetic rubber plants to private firms (see THE CHEMICAL AGE, 1955, **72**, 648) has now been approved by Congress. Both the House of Representatives and the Senate rejected resolutions calling for Congressional disapproval of the disposal arrangements.

As a result of the sale, the price of synthetic rubber may go down, according to Mr. F. D. Ascoli, former managing director of Dunlop Plantations Ltd., who has just retired after 29 years with Dunlop. Speaking at a press conference held shortly before his retirement, Mr. Ascoli said that only an American could really tell what was likely to happen, but from what he knew of Americans he thought that competition between private firms was more likely to bring prices down than send them up.

He pointed out that in the USA about twice as much natural latex rubber as synthetic latex was used, since although the latter was cheaper it was not of the same quality. However, some method might be found of making synthetic latex of equivalent quality.

Mr. Ascoli had charge of Dunlop Plantations Ltd. since he retired from the Indian Civil Service in 1926. He was also technical adviser to Dunlop Malayan Estates Ltd. and a director of Semtex Ltd. He has been a member of the Council of the Rubber Growers' Association since 1927 and was its chairman in 1946. From 1930 to 1946 he was chairman of the Council of the Institution of the Rubber Industry and in 1948-49 he became president. Last year he was awarded the Hancock Medal by the Institution for conspicuous services to the industry.

Nuclear Energy Engineering

BRUSH Electrical Engineering Co. Ltd. have established a section at their Loughborough works to study the special requirements of electricity generating stations powered by nuclear energy. This section will be under the direction of Mr. J. H. R. Nixon, M.I.E.E., M.I.Mech.E.

The company has already developed and supplied specialised electric motors in large quantities for the use of the Atomic Energy Authority in some of their current operations. Further development work is in progress in connection with the design of auxiliary equipment for application to large power schemes.

Exemptions From KID

THE Treasury have made an order under Section 10(5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty, for the period beginning 28 March and ending 18 August: mono-*tert*.butyl-4-hydroxyanisole, *sec*.butyl alcohol, crotonic acid and silicon tetrachloride. This order is the Safeguarding of Industries (Exemption) (No. 2) Order, 1955, and is published as Statutory Instruments 1955, No. 450. Copies may be obtained (price 2d. net, by post 3d.) from HM Stationery Office, Kingsway, London W.C.2, and branches, or through any bookseller.

Hypalon

A New Chemical Rubber

DU PONT's 'Hypalon' chemical rubber, which is chloro-sulphonated polyethylene, is so new that applications for it are still being discovered as its properties become more fully known, according to a recent speech by Samuel W. McCune III, of the Elastomers Division, before the Philadelphia Rubber Group. It is being tested in a wide variety of finished products, of which some are already being produced on a commercial scale, while others are still in the developmental or experimental stage.

The most important characteristic of this new chemical rubber is its resistance to the deteriorating effects of heat, ozone, and chemicals. Almost equally important is the fact that it can be compounded in a wide range of colours, which retain their original physical properties even after long exposure to outdoor weathering. To obtain the best colour stability, it is desirable to use pigments which screen out ultraviolet light. Titanium dioxide and other pigments, such as phthalocyanine green and blue, iron oxide red, cadmium selenide, and chrome yellow, are effective for this purpose.

Derived from Polyethylene

'Hypalon' has a specific gravity of 1.1. It is derived from polyethylene, has a number average molecular weight of 20,000, and contains approximately 27 per cent chlorine and 1.5 per cent sulphur. A vulcanisable elastomer, it must be compounded with the proper curing ingredients to produce suitable vulcanisates. In its unvulcanised form it is readily soluble in aromatic and chlorinated hydrocarbons; and it is swollen, but not dissolved, by ketones and esters. It is insoluble in aliphatic hydrocarbons, alcohols, and glycols.

Vulcanisates of 'Hypalon' containing no filler loading possess tensile strength in the range of 3000 psi. and ultimate elongation in the range of 500 per cent. The tensile strength is not decreased materially by the incorporation of relatively large quantities of fine particle size whiting and clays, nor does the addition of carbon black result in increased tensile strength. The addition of these fillers does increase modulus, stiffness, and hardness, and decreases ultimate elongation. Carbon blacks, fine particle size whiting, clay, and blanc fixe are satisfactory fillers, but calcium silicate contains water of hydration which will activate the cure of 'Hypalon' and may cause scorching of stocks.

'Hypalon' vulcanises to a harder, stiffer compound which has lower resilience and higher permanent set than a similar compound of other elastomers. The Shore Durometer hardness range for conventional stocks is from 60 to 90. Softer compounds can be made by incorporating a plasticiser.

It is in its resistance to the effect of deteriorating influences that this new chemical rubber is outstanding among elastomers. It is unaffected by ozone even when under strains up to 250 per cent. Resistance to oxidation is also demonstrated by its stability at elevated temperatures.

When properly compounded, this new chemical rubber has excellent resistance to chemical attack. Its superiority over other elastomers in this respect is particularly notable in applications which involve exposure to oxidising agents such as sulphuric, chromic and nitric acids, hypochlorite and chlorine dioxide solutions, and hydrogen peroxide.

Radioactive Wastes a Hazard

A CHEAP safe method must be found to dispose of radioactive wastes created by future atomic power plants, Mr. A. M. Aikin of the Chemistry and Reactor Research Division of Atomic Energy of Canada Ltd. told the chemical engineering division of the Chemical Institute of Canada recently. Otherwise, he went on, radioactive fission products yielded by atomic energy plants producing electricity will present a hazard in the vicinity.

Radioactive wastes from atomic power reactors for experimental work were now stored in tanks, but this was a temporary, costly method, he said. A more permanent and cheaper method was to mix the wastes with cement and bury them, but the cheapest disposal method was to find a market for the wastes and sell them.

Titanium Dioxide

The Treasury have made the Import Duties (Exemptions) (No. 2) Order, 1955, which continues for a further period of six months ending on 26 September, the exemption of titanium dioxide from duty chargeable under the Import Duties Act, 1932.

Chemicals & Textiles

THE close link between modern chemicals and modern textiles was emphasised in a recent lecture by Dr. G. Landells, deputy chief chemist of the Bradford Dyers' Association.

'The finisher to-day,' said Dr. Landells 'is confronted with an amazing variety of agents with which to achieve both decorative and useful effects in textiles.

'Resins, for instance, are used by the textile finisher in subtle ways to enhance the appearance and properties of fabrics.' Dr. Landells said that the principal use of resins was to improve crease resistance of cotton and rayon fabrics, but it has also been discovered that they can be used for permanent decorative results such as glazing, embossing, pleating or shimmer effects.

'Silicones, too,' said Dr. Landells, 'have changed the appearance of women out of doors. They can now have high fashion raincoats in brightly coloured acetate and nylon because of silicones' water repellant properties.' Dr. Landells added that improved methods of using the silicones had been developed in Bradford.

The lecture was sponsored by the Society of Dyers and Colourists in memory of John Mercer, one of Britain's greatest textile chemists.

New Fire Retardant

CELANESE Corporation of America has begun semi-commercial production of a new fire retardant plasticiser, Celluflex CEF (*tris*-β-chloroethyl phosphate), it was announced this week. Produced at the Newark, New Jersey, plant of the Chemical Division, the material is available in drum quantities. Celluflex CEF, it is claimed, gives unique fire-retardant properties to a variety of moulded and extruded plastics and surface coatings including vinyls, cellulose acetate, ethyl cellulose, nitrocellulose, butadiene-acrylonitrile copolymers, rubber chloride, etc., where its clear-water-white colour permits its use in transparent and pastel shaded items.

That Celluflex CEF is significantly more chemically stable than related materials, is indicated by the fact that the acidity of the product even after being subjected to elevated temperatures is considerably lower than other trichloroethyl phosphates. At the present time, there are three broad avenues of potential use for Celluflex CEF—in protective coatings such as paints, lacquers and shellacs; in resins and plastics; and in textile finishes as a flame-retardant. Test lacquers made with the material have shown greatly improved fire-retardant properties, and it is possible that its use may expand the number of applications in which nitrocellulose lacquers can be used safely.

More Co-operation Urged

MORE collaboration between firms would be of value to the pharmaceutical industry, says a report on the industry just published by the British Productivity Council (21, Tothill Street, S.W.1). Individual firms have made striking advances in efficiency, but speaking generally there is still plenty of scope for improvement. The unique character of the industry does not exempt it from the application of the recognised industrial techniques used to increase productivity—work study, production planning, standard costing, incentives, etc.

The report criticises the lack of any widespread desire to pool ideas through the interchange of factory visits and exchanges of technical information. On the credit side can be put the preservation of excellent labour relations and the provision of a high standard of amenities for workpeople. Many of the ideas for new machines and methods to increase productivity have come from workers encouraged by suggestion schemes.

A fuller summary of the report (*The Machines behind Medicines: A Review of Productivity in the Pharmaceutical Industry*, 2s. 3d.) will appear in next week's issue.

Trade Journal Record

With 596 pages, the Spring Issue of *The Hardware Trade Journal*, published by Benn Brothers, proprietors of THE CHEMICAL AGE, is thought to be the largest issue of a weekly trade journal ever published in the world. Weighing 3 lb. 2 oz., the Spring *H.T.J.* contains 515 pages of advertisements, contributed by 958 advertisers. This represents 71 more advertisers than last year, when the journal was of pocket size. Editorial content comprises 81 pages, nearly 100 per cent increase on last year. Price of the journal remained at 1s. for this special issue.

Chemical Fume Extraction

PVC Fans & Fume Cupboards

IN laboratories and chemical processing plant, the chemist and engineer have for long enough suffered the unpleasantness of obnoxious fumes and processes. Apart from the fundamental desirability of working in normal air conditions, the additional burdens of having to suffer the distraction of noisy exhaust fans, and the periodical necessity of replacing chemical fume exhaust fans and ducting due to the ravages of corrosion, have resulted in the developments described in the following paragraphs.

Essential Requirements

It may be as well in the first instance to consider the essential requirements of an efficient fume removal system for laboratory fume cupboards and hoods. The fundamental demand made upon any laboratory exhaust system is that it should efficiently remove all chemical fume from the working area. All too often do we come across systems which fail to do their job unless the fume is sparse and light, and the prevailing wind is in the right direction! Indeed, it is not unusual to find cases where fume is blown back into the laboratory by an active breeze which is able to overcome the puny efforts of an inefficient fan.

Secondly, the problem of air and mechanical noise in the exhaust system is one which has to be tackled, and is, in the main, obviated only by efficient equipment design. Of equal importance, and often accepted as a justifiable overhead, is the need for periodical replacement of fans and ducting which disintegrate through the effects of corrosion. It has not been unusual to see gaping holes in the sides of ducts, and to find on examining a fan that the impeller blades have disappeared, leaving a singularly ineffective impeller boss.

Finally, and by no means least of all, it is clear that the modern laboratory is very well designed in the architectural sense, and it is essential that the ancillary equipment used is attractive and hygienic. Modern laboratory furnishings do much to accomplish this result, and there is no reason why exhaust equipment should not present a similar uniform and colourful appearance.

To a very great extent, the demands of the ideal laboratory fume exhaust system have been met by Turner & Brown Ltd., Bolton, who manufacture the 'Turbro' range of PVC exhaust fans and ducting.

The outstanding chemical resistance of PVC is well known, and the fans are interesting if only because of the fact that the multi-vane impellers are made entirely of the rigid form of this material. This has been made possible following considerable experimental work, and the finished product offers many advantages over the earlier methods of coating metal impellers.

The range of fans offered at the moment varies from a laboratory fan unit displacing 300 cu. ft. per min. against 25 in. water, to one which displaces 5,000 cu. ft. per min. against 5 in. water. Satisfied users substantiate the claims made by the manufacturers that these fan units are extremely quiet in operation, and that the collection of solid particles on the impeller and internal surfaces of the case is negligible.

An Efficient Range

Ducting to suit the fans is supplied in rigid PVC of all colours, and in polythene natural (white) or black. The overall result has been to produce an efficient range of exhaust equipment which will ensure positive removal of all fume normally present in the laboratory fume cupboard, is smooth running and virtually noiseless, is attractive to look upon and efficiently designed, and will not corrode. The equipment is capable of handling all fumes up to 60°C. Further interesting developments covering the production of a complete fume extraction unit with built-in scrubber are in hand.

The 'Turbro' fume cupboard exhaust unit can be supplied either complete with fume cupboard to the customer's requirements, or ready for installation into an existing fume cupboard. The installation can be carried out by the manufacturers, and the complete fume cupboard unit offers the advantages of a white PVC lining, and a drainage system in acid-resisting polythene, if required. Neither the fan, the inlet ducting, nor the scrubber unit is visible, although all are accessible by the easy removal of the exterior panelling.

Safety Notebook

AMONG the features of this year's Factory Equipment Exhibition at Earl's Court is a specially designed theatre to show the most modern types of protective and safety clothing worn by professional models. Products of about 20 firms are shown three times a day and a commentary is given by Miss Gwen Danvers, well-known fashion expert.

The exhibition, which continues until 2 April, was officially opened on 28 March by Sir Miles Thomas, D.F.C., chairman of BOAC, who said that it had been estimated that the average American industrial worker had some 8 HP at his beck and call, while in this country the figure was only about 4 HP and in Western Europe as a whole 2½ HP. 'Much still remains to be done before we in Britain equal and—I may modestly hope—eventually surpass our lively and progressive American friends,' he went on. 'Nevertheless, it is heartening to see evidence of a vigorous approach to these matters at this exhibition.'

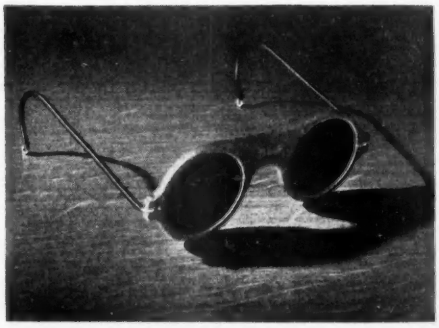
New safety devices and equipment are an important part of the exhibition. One firm (Northide Ltd., Stockport) are showing 'Strongoflex' PVC boots, which are claimed to be 'a revolutionary advance in industrial protective footwear.' The boots, which will not be generally available for a few weeks, are claimed to be non-perishable, and harder wearing, more comfortable and with a safer grip than other protective boots. They have roller supports for the arches to reduce fatigue, prevent clogging with soil and improve comfort, and can be rolled into a small size for carrying. They are resistant to most acids, alkalis, sea water, sunlight, abrasions, and flames but are not proof against solvents.

On show for the first time were four new barrier creams developed by Rozalex Ltd. (Manchester). Rozalex Barrier No. 9—water resistant—protects against organic solvents, dye intermediates, synthetic resins and glues. No. 10, water repelling, is designed to give a higher degree of protection than ever before where there is a risk of toxic absorption. No. 11 is a step forward in protecting against the newer paint solvents and synthetic substances used in paint manufacture, and No. 12 has been specially developed for combating the risks of the pitch and tar industry.

The exhibition is concerned with all aspects of factory efficiency, and there have been conferences on such subjects as work study, fuel efficiency and works management during its course.

* * *

SAFETY Products Ltd. (St. George's House, 44 Hatton Garden, London E.C.1) believe that their new addition to the Pulsafe range of safety goggles are unique in this country in that they are made of moulded nylon, or bakelite laminated.



The Pulsafe Tough-Spec, Type PBS-1, made by Safety Products Ltd.

There are three new types of goggle—the nylon welder goggle, the nylon grinders' goggle and the 'Tough-Spec' with a bakelited laminated frame, all of which are practically indestructible. A special feature of the nylon goggles are the anatomically shaped eyecups which, in conjunction with the adjustable nosebridge, ensure a perfect and comfortable fit.

* * *

THE steady improvement in accident frequency rates at the I.C.I. Billingham works received a check last year, when there were several fatal accidents, more than for some years. This was said by the Divisional chairman, Mr. W. J. V. Ward, when he presented the 1954 inter-works safety

trophy to Research Works. One encouraging feature was the record of the winners, who had cut their accident frequency rates of the past two years by 54 per cent. Three other works also improved—Commercial by 28 per cent, the Anhydrite Mine by 24 per cent and the Gas and Power Works by 7 per cent.

Safety incentive awards also went to the following, according to *The Tees-side Journal of Commerce*, which reports the ceremony in its March issue: Services Mechanical Section, Engineering Works, £20 for a 600,000 hours' accident-free period and £15 for 400,000 hours; Process Laboratories, Product Works, £15 for 400,000 hours, Board and Gypsum Plants, Casebourne Works, £15 for 400,000 hours; Workshops, other than Machine and Blacksmith's Shop, Engineering Works, £10 for 200,000 hours.

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AT the third Safety and Factory Efficiency Exhibition, organised by the Birmingham and District Industrial Safety Group, there will be at least 50 per cent more space occupied by exhibitors' stands than at the last exhibition. The exhibition, which will last for a week, is to be officially opened on 24 June.

From 24 to 26 June a residential congress will be held under the general title of 'A Social and Factual Examination of Industrial Accidents'. Speakers will include a managing director, a works manager, a trade unionist, a doctor, a supervisor, a plant engineer, a production engineer and a safety officer. A contribution to the congress will be made by the Centre for Safety Education, New York University, under the title 'An American View.'

The emphasis of the exhibition will be on the safety, health and welfare of all industrial workers, coupled with factory efficiency in the broadest sense. A section will be devoted to an 'Ideal Factory Feature', which will show the possibilities of factories of the future, equipped with the latest devices.

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THE industrial museum at 97 Horseferry Road, London S.W.1, has been completely reorganised and renamed the Industrial Health and Safety Centre. The formal renaming was performed by Sir Walter Monckton, Minister of Labour and National Service, on 22 March. The centre is a permanent exhibition of methods, arrangements and appliances for promoting safety, health and welfare in industry.

It takes up three floors, and the exhibits cover the whole field of industrial health and safety. Among the subjects dealt with are industrial diseases, suppression of dust, protective clothing and fencing devices.

Sir Walter Monckton, Minister of Labour, examines a Thermofoil heat-reflecting lightweight non-inflammable suit which is coated with a thin layer of aluminium foil. He was having a preview of the Industrial Health and Safety Centre before the formal renaming ceremony on 22 March

There is a special chemical section which offers many ideas of safe practice, including the handling of corrosive liquids in small quantities and in bulk, and the storing of radioactive substances. There are also photographs and models of types of valves used in chemical plants. Another section shows methods of combating fire.

The centre is open from 10 a.m. to 4 p.m. from Mondays to Fridays and from 10 a.m. to 12 noon on Saturdays. Parties from factories, industrial associations, technical institutions, etc., can be shown round by HM Inspectors of Factories.

Borax Had a Good Year

But Chairman Speaks of Taxation Difficulties

IN his annual statement to shareholders, the chairman of Borax Consolidated Ltd., Mr. Desmond Abel Smith, MC, says the firm have had a very good year. The net profit available for allocation and appropriation in the accounts of the parent company was nearly £145,000 more in 1954 than in 1953 (£783,050 compared with £638,448). Trading profits of the group were £1,712,834, compared with £1,385,539.

The statement goes on: 'Last year I told you of our intention not only to expand but also to remain competitive in every sense of the word. As you have recently learned, we now have certain concrete and well advanced plans aimed at reducing costs and thus increasing earnings. Your management have been examining these plans carefully but further studies must still be undertaken before we can take the final decisions.

'Our future plans are intended to achieve three principal objectives: to extend the life of our mines in California by improving ore recovery; to provide increased mining and refining capacity to meet expanding needs; and to increase profits by reducing and expanding volume.

'The plans contemplate expenditure over a number of years, but important financial benefits should accrue during the third year after work is started. In the aggregate the capital expenditure would exceed our cash reserves but by spreading the expenditure over several years, borrowings will be fairly modest. Engineering for the first phase is substantially complete and work could commence within 30 days of authorisation. Our installations are in a desert area and this always presents special problems. We hope to resolve them during the next few months.'

Dealing with the unsuccessful take-over bid by an American group earlier this year, the statement says: 'We welcome American shareholders in this company. A large part of our business is conducted in the United States and if citizens of that country desire to invest in the company, it is probably because they are good judges and we should regard it as a compliment.'

The statement then has a few words about taxation: 'The burden of taxation on those British companies which have to compete in world markets—and particularly those in the mining industry overseas—is still far too heavy. My comment applies especially to the situation of your company, which has to fight hard to maintain its place in markets throughout the world and has a large stake in the market for boron products in the USA. Without a doubt one of the most important factors leading to the recent attempt by the American Group to acquire your company was the high rate of taxation which your company has to shoulder in comparison with the taxes borne by an American domiciled corporation conducting mining activities of a similar character.

'In the USA your company gets the benefit of special "depletion allowances" which greatly reduce the taxes on profits payable in that country—these allowances are granted expressly to encourage mining enterprises in the USA. But we, unfortunately, as a British company have to surrender the whole of these tax savings to the Inland Revenue here.

'I wonder if it is realised that as long as this taxation policy continues in Britain, there can be no incentive to any company resident in the United Kingdom to launch any new mining enterprise in any of those countries where "depletion allowances" are granted. I believe it to be true that in recent years not one single new mining company, resident here, has started operations overseas.

'There is little doubt that if this taxation policy continues, it will lead in the end to the loss to Britain of all mining interests resident in the UK and operating in those countries that give "depletion allowances." Such countries include the United States, Canada, Australia and Southern Rhodesia.'

The statement says that deliveries by the United States Potash Company—in which Borax have a substantial interest—recovered their previous satisfactory level, after a fall in demand, due to a severe drought, in 1953. During the year the firm acquired a borate mine in Turkey. This is still in its very early stage of development and it will be some time before it is in full operation.

COURS DE CHIMIE INDUSTRIELLE. V. Industries Organiques. By G. Dupont. Gauthier-Villars, Paris. 1954. Pp. 374. Fr. 2,500.

This book forms part of a treatise upon industrial chemistry intended for the student and other readers requiring a general outline of the subject rather than a detailed examination. It deals with six topics in industrial organic chemistry; dyes and tanning, essential oils and perfumery, resins and turpentine, macromolecular substances and their application, paint and varnish, and photographic products. The treatment is very uneven, some topics being examined at great length and others only superficially; two of the topics occupy nearly two-thirds of the book. In addition, some accounts appear to be domestic in character, referring only to those procedures carried out in France, rather than those in operation in other parts of the world.

The first chapter gives a good classical outline of the theory of colour and constitution, common natural and synthetic dyes and their intermediates, and the standard methods of dyeing. Tanning is covered with equal facility and the impression is gained that the author is completely at home in these subjects. The second chapter is disappointing in so far as it devotes so little space and gives so few details of the art of perfumery in which the French cosmeticians are the acknowledged masters. There follows an interesting account of the production of oleoresin from pine wood and it is significant that this is an industry in which the French production ranks second only to that of the United States.

Considering the very large amount of information available the coverage of the next chapter is, with a few exceptions, quite good. There are several useful tables, some good illustrations and an up-to-date list of references on synthetic plastics. The statement on p. 297 concerning the production of fibres from Teflon would however appear to require verification, and it seems strange that asbestos should have been included in a chapter upon organic fibres.

The examination of the paint and varnish industry is superficial in nature and the differentiation made between Prussian Blue and Turnbull's Blue as ferric and ferrous ferrocyanide respectively is not in accordance with modern concepts of the structure of the 'iron blues.' The pigment referred to on p. 312 as 'le vert malachite' might with advantage have been described as 'vert de montagne.' Although derived from the mineral 'la malachite' by grinding, such a name invites confusion with the synthetic organic dye. The most serious omission from this chapter is that of the phthalocyanines or Monastral pigments. The price quoted for vermilion in this chapter of Fr. 80 per kg. will also appear strange to readers in this country.

In the final chapter the author has made no serious attempt to cover modern aspects of the photographic industry. The demand for this treatise in England is not likely to be very large in view of the high cost of this single paper-bound medium-sized volume. —E.A.

THE ANALYSIS OF DRUGS & CHEMICALS. By N. Evers & W. Smith. Charles Griffin & Co. Ltd., London. 1955. Pp. 546. 60s.

As might be expected, the new edition of 'Evers and Elsdon' contains all the information necessary to an analytical laboratory engaged in the routine production control of pharmaceuticals and allied chemicals. Many of the standard methods described are those which are recommended in the British Pharmacopoeia and the British Pharmaceutical Codex, but in some specific cases the authors have, from their wide experience in the assay of drugs, developed a personal preference for some alternative method. For this and other reasons, as the authors have stressed in the preface, the book should not be considered as a substitute for the above

publications, but rather as a supplement to them.

After an introductory chapter describing the operations of weighing and the standardisation of volumetric glassware the place of physical methods in pharmaceutical analysis is discussed. The authors have wisely chosen to detail only those methods which have been well tried, preferring to omit references to techniques still in the process of development. There follows a short account of the standard reagents used in volumetric analysis and a list of the general methods used in the detection and determination of specific constituents, such as trace metals, sulphur dioxide, etc.

The technique of titration in non-aqueous solvents is omitted and this is rather surprising in view of the claims put forward for this technique in the United States. In particular the possibility of titrating the alkali metal salts of organic acids in glacial acetic acid solution with standard perchloric acid is not mentioned despite the obvious advantages over the ether extraction method. A complex extraction procedure is also recommended for the determination of traces of copper in the presence of iron without reference to specific reagents of the cupron type.

The next two chapters list procedures for the analysis of a number of inorganic and organic chemicals. It should be stressed that these are frequently only applicable to fairly pure samples, and are rarely suitable for mixtures or for samples with gross impurities. Again, the end use of the chemical must be the guiding principle in the selection of the analytical method. The methods detailed are therefore not necessarily those suitable in other industries; a sample of ferric chloride, for instance, satisfactory for pharmaceutical use, might well be useless for the etching of copper plate.

Natural products, and oils, fats and waxes occupy the next two chapters; there are methods for the assay of the commonly used antibiotics, enzymes, vitamins and alkaloids, and the examination of soaps. Separate chapters are devoted to essential oils, crude drugs, and galenicals. The book concludes with a very interesting account of the use of statistics in chemical analysis, a subject often neglected in the industrial laboratory. A great deal of useful information is provided in the appendices which contain lists of solubilities, specific gravities, refractive indices and proprietary names.—J. R. MAJER.

RADIOISOTOPE CONFERENCE 1954. Sponsored by the Atomic Energy Research Establishment, Harwell. Edited by Johnston, Faires & Millett. Butterworths Scientific Publications, London. 1954. Pp. 418 + 213. 100s. both volumes.

Vol. I. Medical & Physiological Applications (Therapy, Diagnosis, Animal Physiology & Pathology, Biochemistry, Plant Nutrition & Allied Subjects). 65s.

Vol. II. Physical Sciences & Industrial Applications (Chemistry, Metallurgy, Physics, Industrial Applications). 45s.

At the Second Radioisotope Conference at Harwell last July 280 papers on the applications of radioisotopes were submitted for presentation. Of these 70 were accepted, and are published here, together with the discussions which followed them.

Nearly all the papers in Volume I deal with individual pieces of research into medical and physiological problems; most chemist readers will not be interested in very many of these. Most of the papers in Volume II are concerned with specific research problems of restricted scope, but there are ten papers in this volume which deserve particular attention because they review recent work more broadly than the others, or because they open up new possibilities for the use of radioisotopes. Among the subjects covered by these are the use of radioisotopes in the study of vinyl polymerisation, possible industrial uses of krypton-85 and tritium, purification of metals by zone melting, as revealed by radiotracers, the uses of radioisotopes for water flow and velocity measurements, new source isotopes for radiography, and the gamma ray sterilisation of food. These papers make Volume II a worth-while if rather expensive purchase.

The general impression conveyed by this publication is that there have been no spectacular recent developments in the field, but that research workers are beginning to feel at ease with this new tool, and are eager to apply it early in the study of new problems.

There are now so many uses for radioisotopes that the subject can no longer be considered a single branch of science, and it is doubtful whether there is much point in publishing in collected form like this a heterogeneous assortment of research papers which would normally appear in due course in the periodical literature.—H. G. HEAL.

HOME

Rockefeller Grant

The Rockefeller Foundation has made a grant of $60,000 to Queen's University, Belfast, for the provision of equipment in the department of chemistry.

Fifth Platformer Operating

The British Petroleum Company's fifth platformer went into commission at Kent Oil Refinery, on the Isle of Grain, on 15 March. The other four units are in operation in BP refineries at Aden, Kwinana (Western Australia), Lavera (France) and Hamburg. A sixth platformer is nearing completion at Llandarcy Refinery, in South Wales, while the foundations for a seventh are being laid at Porto Marghera Refinery, near Venice.

New Chemical Company

The plant which British Petroleum Chemicals is building at Grangemouth for the production of alkylate will be taken over on completion in the last quarter of this year by a new company called Grange Chemicals Ltd. The new concern has been jointly formed by British Petroleum Chemicals and the Oronite Chemical Co. of San Francisco, which is a subsidiary of Standard Oil of California.

New Q. & Q. Agency

Quickfit & Quartz Ltd., manufacturers of scientific and industrial glassware, of Stone (Staffs), announce that Griffin & George Ltd. have been appointed as official distributors and stockists in the United Kingdom for Quickfit interchangeable laboratory glassware.

I.Chem.E. Visit to Sweden

Arrangements have been made by the Graduates' and Students' Section of the Institution of Chemical Engineers for a visit to Sweden from 16 to 26 June. The tour will include a wide cross-section of Swedish industry and will extend from Stockholm to Gothenburg by a circular route. It is hoped to arrange visits to about 10 works, etc., of various types. Participation in the tour, which will cost altogether about £50 per head, is open to all members of the Institution, but preference will be given to graduates and students.

Change of Address

F. J. Hone & Co. Ltd. have changed their address to 19 Eldon Park, London S.E.25. The title of the firm was recently changed from F. J. Hone & Company.

Epikote Resin Price Reduction

A reduction in the price of Epikote resin 828 is announced by Shell Chemicals Ltd. From 28 March the new price of this grade is 9s. 9d. per lb. for lots of 1-4 tons, as against the earlier price of 12s. 6d. per lb. This reduction is made possible by increased production of Epon 828 in the United States resulting from the growing use of these new resins. Full scale manufacture of Epikote resin 828 in this country is scheduled for the middle of this year from the new resin plant at Stanlow.

Selling Agents in Eire

Price's (Bromborough) Ltd., Bromborough Pool, New Jersey, nr. Birkenhead, announce that they have appointed Goodbody Ltd., of Ibex Buildings, Dun Laoghaire, as their sole selling agents in Eire. As well as providing the normal facilities which are associated with a selling agency, Goodbody's, whose appointment dates from 1 April, will extend their technical service to cover the full range of Price's products.

Birmingham Meeting

An ordinary meeting of the Midlands Section of the Society for Analytical Chemistry will be held at 6.30 p.m. on 6 April in the Mason Theatre, The University, Edmund Street, Birmingham 3. A lecture on 'The Analytical Chemistry of Niobium and Tantalum, with Particular Reference to Steel and Allied Materials' will be given by B. Bagshawe, of the Brown-Firth Research Laboratories, Sheffield.

Open Days at Sheffield

Sheffield University is to celebrate its golden jubilee by holding three Open Days, on 28, 29 and 30 April. Among the blocks open to visitors will be the new chemistry building, opened last year and designed as the first of a large group of buildings eventually to be erected on the same site. Before the Open Days, on 27 April, the new engineering building is to be officially opened.

· OVERSEAS ·

More Expansion in Canada

Pfizer's are to establish a plant in Arnprior, Ontario, expected to cost several million dollars. A start will be made this month with a first production unit costing about $100,000, and production is expected to start in October.

French Chemical Output

Provisional figures of French chemical production during February have been issued by the French Ministry of Industry. They are (all in metric tons): chlorine, 12,000 (January, 13,400); sodium carbonate, 55,000 (62,400); lime, 125,000 (129,800); carbon disulphide, 2,838 (3,109); superphosphate, 90,000 (89,260); nitrogenous fertiliser, 28,200 (29,760); copper sulphate, 6,000 (6,964).

Austria's Cement Production Rises

According to preliminary estimates, the Austrian cement production in 1954 reached 1,616,925 tons, which is a new all-time high. The 1953 total production was 1,393,842 tons. Compared to 1937, the latest Austrian cement production figures are about four times as high.

Germany Imports More

In 1954, Germany imported DM.892,000,000 worth of chemical goods —44 per cent more than in the previous year. Exports in this field, on the other hand, rose only by 28 per cent, to DM.2,980,000,000 worth. Behind the rise in imports lies not only the favourable trend in the German market generally, but also broad measures liberalising German imports.

Bath for Nylons

An alcohol bath which gives nylon stockings a permanent protective coating is a new advance in the Australian manufacture of nylon hosiery. The process was discovered almost by accident when the Australian Commonwealth Scientific and Industrial Research Organisation was doing research work on the shrink-proofing of wool. It is claimed that the stockings treated have a longer life, greater elasticity, less chance of snagging, and have strengthened nylon fibres. No details of the process have been released.

Sugar Mill for Pakistan

A new sugar mill at Jauharabad, Pakistan, started production on 18 March. As well as producing 10-12,000 tons of sugar a year in its initial stages, the mill will produce over 5,000 tons of molasses, which in turn will yield about 346,000 gallons of power alcohol.

Chemical Plant for Montreal

A $22,000,000 chemical plant is to be built at Montreal to manufacture high-analysis nitrogen and phosphate chemical fertilisers. It will be operated by Northwest Nitro-Chemicals Ltd., of which New British Dominion Oil Co. will hold a 20 per cent stock interest.

New Chemical Enterprises in Israel

The Israel Ministry of Development is conducting negotiations with investors from South Africa about the establishment of large chemical enterprises in the south of Israel to use raw materials found in the Negev and in the Dead Sea. Since the Fertilisers & Chemicals Company of Haifa already supplies all the local demand for such chemicals, it is expected that the chemicals produced will be exported.

Canadian Firm Loses Tariff Appeal

Canadian Resins and Chemicals Ltd. of Montreal has lost its Tariff Board appeal for protection against imports of capryl alcohol, iso-octyl alcohol and dicapryl phthalate, imported mostly from the United States and allowed into Canada duty-free. The company argued that the chemicals are of a kind made in Canada and therefore should bear a duty of 20 per cent. However, the board said in a statement that expert evidence indicated none of the chemicals is being produced in Canada.

Diversification Trends

There is at present in the United States and Canada a very definite movement toward diversification in chemicals, reports the Toronto Purchasing Agents' Association in the latest report of a survey. This is being accomplished mainly through the medium of mergers. Most of the companies involved are Americans, but many of them have Canadian subsidiaries, and the effects will be felt in Canada.

· PERSONAL ·

Union Carbide Canada Ltd. have announced the appointment of MR. DAVID W. KENNARD as traffic manager and MR. HAROLD J. SCARTH as manager of purchasing. Mr. Kennard and Mr. Scarth will coordinate traffic and purchasing matters for Union Carbide Canada Ltd. and its divisions, which include Bakelite Company, Carbide Chemicals Co., Dominion Oxygen Co., Electro Metallurgical Company and National Carbon Company.

It has been announced that DR. D. W. G. STYLE, Ph.D., reader in chemistry at King's College, London, has been appointed to the University chair of chemistry at that college.

The title of reader in organic chemistry in the University of Birmingham has been given to DR. E. J. BOURNE, Ph.D., D.Sc., A.R.I.C., senior lecturer in organic chemistry; DR. B. G. GOWENLOCK, B.Sc., Ph.D., has been appointed lecturer in chemistry; MR. S. J. LYLE, B.Sc., M.Sc., has been appointed to the J. Lyons fellowship in analytical chemistry; and DR. H. SPEDDING, B.Sc., M.Sc., Ph.D., of the British Cotton Industry Research Association, has been awarded the title of University research fellow during the tenure of his present post.

Following the acquisition of Petrochemicals Ltd. by Shell Chemicals Ltd., the directors appointed by the Finance Corporation for Industry Ltd., MR. GODFREY H. OWTRAM, MR. E. J. BARNSLEY, AIR MARSHAL SIR JOHN BRADLEY, K.C.B., and SIR ROBERT ROBINSON, O.M., have resigned from the board, as has also MR. P. C. CHAUMETON. Shell Chemicals Ltd. have appointed their own board of directors from within the Shell organisation.

MR. ALAN J. THOMAS, M.A., of the agricultural chemistry department, University College of North Wales, Bangor, and MISS MARGARET KNIGHT, only daughter of Mr. and Mrs. E. F. Knight, of Borough Road, Birkenhead, were married at St. Stephen's Church, Prenton, Birkenhead, on 26 March.

MR. W. V. BINSTEAD has joined the development department of the British Welding Research Association. In his capacity as a development engineer, Mr. Binstead will be visiting industrial organisations where assistance is called for in connection with welding problems. The Association is expanding its development service and, during the next two years, will be holding a series of lectures on 'Increased Productivity due to Welding' in many parts of the country. This programme, which Mr. Binstead is organising, has been made possible as a result of American funds that have been provided by the Department of Scientific and Industrial Research.

MR. A. G. THOMPSON, a member of the BWRA staff, will be attending the intra-European Mission for the comparative study of welding techniques as a specialist in welding productivity nominated by the European Productivity Agency.

New director of Remploy, the company established by the Government to provide employment for severely disabled people, is MR. A. T. S. ZEALLEY, J.P., M.Sc., A.R.I.C., who recently retired from the board of I.C.I. (see THE CHEMICAL AGE, 1955, **72**, 292).

MR. W. W. MACKENZIE, president of the Canadian Chemical and Cellulose Co. Ltd., has been elected a director of the Canadian Bank of Commerce.

MR. ROBERT J. QUINN, chemical engineer and former sales executive of Mathieson Chemical Corporation, now Olin Mathieson Chemical Corporation, has died in Tucson, Arizona, after an extended illness. He was 65 years old and had been living in retirement at Tucson since 1953. Mr. Quinn had been prominent for many years in chemical circles, having served as president of the Compressed Gas Manufacturers' Association in 1945 and president of the Salesmen's Association of the American Chemical Industry in 1927.

The remarkable development of the chemical industry in Scotland in the past seven years was noted by DR. W. J. JENKINS, B.Sc., Ph.D., retiring chairman of Imperial Chemical Industries Ltd. Nobel Division, when he was honoured in Glasgow on 24 March. Since 1948 there had been an increase in volume of 25 per cent in the chemical industry which was above the increase in general industry, he said. In the Nobel Division of I.C.I. they had doubled their turnover in that period, and in the coming

10 years he anticipated a further doubling. Dr. Jenkins' retirement was announced last week (p. 743). He is succeeded as chairman of the Nobel Division by DR. JAMES CRAIK, M.A., B.Sc., Ph.D., who handed over a scroll, a tray and a set of wine glasses from the board at the ceremony.

At a meeting of the Council of the City and Guilds of London Institute, the Insignia Award in Technology was conferred on nine candidates, including MR. CHARLES HERBERT RUMBLE, for a thesis on 'Modern Methods of Production of Matrices for the Manufacture of Transcription and High Quality Long Playing Records,' and MR. THOMAS ROBSON, for a thesis on 'Practical Considerations involved in the Reduction of Un-accounted for Gas.' The Insignia award in Technology was instituted in November, 1952, and is intended as a mark of distinction for those who have combined sound practical training with an adequate knowledge of the fundamental scientific principles of their subject and who show a capacity for leadership, administration and for applying their wider knowledge effectively in the industry. Awards are made in five industrial groups—chemical, constructional, electrical, mechanical and textile.

A special award has been made in each group to people of distinction in their industry who in their early days gained City and Guilds Certificates or equivalent qualifications. The chemical industries award has been conferred on DR. L. AITCHISON, D.Met., M.Sc., F.R.I.C., F.R.Ae.S., who until his retirement was Professor of Industrial Metallurgy at Birmingham University.

One of the three main lectures to be delivered at the International Congress of Scientific Research Applied to the Textile Industry, to be held in Brussels from 27 to 29 June, will be given by PROFESSOR W. T. ASTBURY, M.A., Sc.D., F.R.S., of the Department of Biomolecular Structure, Leeds University. PROFESSOR C. S. WHEWELL, B.Sc., Ph.D., F.R.I.C., of the Department of Textile Industries, Leeds University, will also attend the conference.

Boots Pure Drug Co. Ltd. make the following announcement: MR. E. R. WALKER, vice-chairman, and MR. B. A. BULL, F.P.S., A.R.I.C., have resigned from the board, having reached retiring age. DR. G. I. HOBDAY, B.Sc., Ph.D., has been appointed director of research and elected to the board. MR. S. HARKER-SMITH, who is already a director of the company, has been appointed director of merchandising. MR. C. L. SAUL, wholesale and export director, MR. D. S. HENDERSON, M.P.S., London director, and MR. E. PARROTT, head buyer, have reached retiring age and have resigned their directorships of Boots subsidiary companies. MR. R. HACKING has been appointed merchandise controller and becomes a director of Boots Cash Chemists (Lancs) Ltd. MR. W. K. OLIVER, M.P.S., has been appointed sales manager and a director of Boots Cash Chemists (Western) Ltd. MR. J. W. SEEKINGS, M.P.S., will have charge of the wholesale and export department and has been appointed a director of Boots Cash Chemists (Western) Ltd. MR. K. D. WILLIAMSON has been appointed head buyer and a director of Boots Cash Chemists (Western) Ltd.

Wills

MR. FREDERICK GEORGE ROBERTS, 37 Church Road, Upton, Cheshire, representative for the Manchester Chemical Co. Ltd., who died on 25 December, left £3,893 (£3,159 net).

COLONEL M. J. C. HUTTON-WILSON, of Crawley Lodge, Camberley, a director and former chairman of Eaglescliffe Chemical Co. Ltd., left £129,690 (duty £60,091).

Productivity in the USA

Sir Ewart Smith, deputy chairman of I.C.I. and chairman of the British Productivity Council, cited American productivity when he spoke to an audience of business men, trade unionists and teachers in Edinburgh on 16 March. Since 1890 productivity per head of the working population in the USA had increased by an average of 3 per cent per year, whereas in the UK it had increased by only 1.5 per cent, he said.

More Synthetic Detergents Used

Synthetic products accounted for 205,000 tons out of a total of just over 500,000 tons of soaps and detergents used in the UK last year, according to unofficial estimates published by the Petroleum Information Board. This is about 40 per cent of the total and compares with a proportion of about one-third in 1953 and 25 per cent in 1952. Exports of synthetic detergents also rose last year, from 18,000 tons to over 30,000 tons.

Publications & Announcements

SUCCESSFUL analysis of complex metal alloys by large direct reading spectrometers has suggested that there is a field for relatively simple direct reading instruments for quantitative analysis, each of them specifically designed for a single analytical purpose. For such applications the high resolution of a spectrograph is not necessary and quite adequate separation of the appropriate spectral lines can be achieved with a much simpler instrument. As a result of numerous experiments it was found that for certain applications such an apparatus could be based on the use of narrow bands interference filters associated with photomultiplier cells, and a successful instrument has been devised by Hilger & Watts Ltd., 98 St. Pancras Way, London N.W.1. A booklet describing the instrument is obtainable from the company.

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TECHNICAL Bulletins Nos. 12 and 13 from the British Oxygen Co. Ltd., Chemicals Division, Vigo Lane, Chester-le-Street, describe polyvinyl acetate granules and emulsion, and their applications in emulsion paints, adhesives, flooring compositions, textile finishing and paper treatment.

* * *

WHAT must be the largest brochure in the world (14 × 19 in.) presents for the first time in this country an electronic brain as a standard commercial product. This is the Elliott 402, made by Elliott Brothers (London) Ltd., Century Works, Lewisham, London S.E.13. Data processing; the evaluation of trajectories; the calculation of strains in structures; the designs of lenses; the tabulation of mathematical functions—these are some of the complex problems which can be solved. The Elliott 402, it is said, can do more in one hour than can be done in two years by an operator using conventional methods.

* * *

'FAITH and the Philosophers Stone' is one of nine articles in the latest edition of the BASF journal from Baden. Others of interest include 'Research as the Basis of Chemical Industry,' 'A Great Artist and Architect in the Service of BASF' and 'Fertilisers, Plant Protection and Public Health.' There is also a short note on 'Two Forgotten Caricatures of Liebig by Graf Pocci.'

WE welcome the return of the *Wild-Barfield Heat-Treatment Journal*. This, their first number since 1942, contains much information of interest to metallurgists. Especially worthy of note are 'Effect of Variations in Hardening and Tempering Temperatures' by Edwin Gregory, and 'Gas Carburising' by L. G. W. Paleworth.

* * *

VOSS Instruments Ltd., Faraday Works, Malden, Essex, give in their latest booklet an up-to-date list of chemical, insulated and various types of industrial thermometers and hydrometers. They also describe the Voss adjustable contact thermometer which allows very fine temperature control of water baths; ovens, moisture testers and similar apparatus.

* * *

TRADE pamphlets have a habit of getting lost just when they are required, and only re-appearing after all hope of finding them has been abandoned. To overcome this difficulty, F. W. Berk and Co. Ltd., P.O. Box No. 193, 1-19 New Oxford Street, London W.C.1, are issuing loose-leaf binders into which all their publications will eventually fit. The binder is sub-divided into sections to facilitate filing.

* * *

'ALKAPAKS' a product of the Paper Goods Manufacturing Co. Ltd., Westmead Road, Sutton, Surrey, provide yet another example of the uses of polythene. As would be expected, these containers are, when sealed, air- and water-tight, resistant to chemical and biological attack, and unaffected by extremes of temperature. They are readily sealed by the application of heat.

* * *

GUIDANCE is offered on design principles in a new booklet published by the Copper Development Association, Kendals Hall, Radlett, Herts, and called *The Strength of Copper Tubes & Cylinders*. It is hoped that a better understanding of the relevant properties of the metal will lead to more efficient and more widespread use of copper for pipe lines and cylinders. The booklet is illustrated and includes a bibliography, a list of British Standards and some alignment charts. It is available free on application to the association.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

BRITISH VITAMIN PRODUCTS LTD., London E.C.—22 February, debenture, to Barclays Bank Ltd. securing all moneys due to or to become due to the bank; general charge. £403,350 plus all sums for time being owing in respect of £50,000 debenture stock of Britvic Ltd. 30 June, 1954.

Satisfaction

C. W. DENNIS LTD., London E., plastic manufacturers.—Satisfaction, 23 February, of debenture registered 3 September, 1951.

Increases in Capital

The following increases in capital have been announced: ERIC D. SINGER (CHEMOTEX) LTD., from £100 to £2,000; SHEFFIELD CHEMICAL CO. LTD., from £100 to £100,000.

Change of Name

The following change of name has been announced: PHARMACEUTICAL LABORATORIES GEIGY LTD., to GEIGY PHARMACEUTICAL CO. LTD., on 15 February.

Company News

Bowmans Chemicals & Howards of Ilford

Bowmans Chemical Ltd. of Widnes announce that negotiations with Howards & Sons Ltd., of Ilford, which have been in progress for a considerable time, have now been concluded for a substantial measure of closer working between the two companies. The arrangements, which are being put into force immediately, involve a long term working agreement with Howards of Ilford Ltd. and the appointment of two representatives of Howards, J. Anthony E. Howard and George C. H. Clarke to the board of Bowmans and the subscription by Howards & Sons Ltd. of 62,500 ordinary shares of 4s. each of Bowmans for cash at par, the price of issue being the approximate market value at the time when the financial arrangements were negotiated.

Spencer-Bonecourt-Clarkson Ltd.

Babcock & Wilcox Ltd. announce the fusion of the trading activities of two of their subsidiary companies, Spencer-Bonecourt Ltd. and the Clarkson Thimble Tube Boiler Co. Ltd. The name of the former company has been changed to Spencer-Bonecourt-Clarkson Ltd., and from 21 March it assumed responsibility for all new business in Spencer-Bonecourt waste heat boilers, the Clarkson marine and industrial waste heat, oil, and gas-fired boilers and the new Autoheat oil-fired domestic boilers. The chairman of the company is Captain (E) W. Gregson, R.N.R., M.Sc. (Eng.), M.Inst.C.E., M.I.Mech.E., formerly chairman of Spencer-Bonecourt Ltd. Mr. S. W. Spurr, M.Inst.F., managing director of the Clarkson Company, becomes managing director, while Mr. A. E. Watkins, M.I.S.I., M.Inst.F., becomes deputy managing director. The offices remain at 14 Fetter Lane, London E.C.4.

Anchor Chemical Co. Ltd.

Sales of the Anchor Chemical Co. Ltd. in 1954 improved over those of the previous year, the chairman, Mr. T. H. Hewlett, said at the annual meeting on 28 March. 'Subject to there being no international complications, it seems reasonable to expect these conditions to stay with us for some time,' he went on. The export market also expanded during the year, in spite of increasing competition. At an extraordinary meeting which followed, resolutions for increasing the capital and issuing one 5s. ordinary share for every ordinary share held were passed (see THE CHEMICAL AGE, 1955, **72**, 600).

Canadian Hydrocarbons Ltd.

Winnipeg & Central Gas Company has announced that subject to securities legislation it will offer its shareholders of record 14 March, rights to buys shares of Canadian Hydrocarbons Ltd. at $7.50 per share on the basis of four shares of Hydrocarbons company for each five shares of Winnipeg & Central Gas held. Canadian Hydrocarbons was recently formed by Winnipeg & Central to plan and control a chain of subsidiaries in fields allied with the western petroleum industry.

Next Week's Events

MONDAY 4 APRIL

SCI (London Section)

London: William Beveridge Hall, Senate House, London University, W.C.1, 9.30 a.m. Opening of symposium on 'The Prevention of Atmospheric and Water Pollution in the Chemical Industry' (also on 5 April).

TUESDAY 5 APRIL

Institute of Metal Finishing

Birmingham: James Watt Memorial Institute, Great Charles Street, 6.30 p.m. 'Criteria for Assessing Bright Nickel Solutions and Prospective Lines of Development' by A. Smart; 'Preparation for Bright Nickel Plating' by H. J. Bache, and 'Maintaining Optimum Performance with Bright Nickel Solutions' by D. R. Newman.

WEDNESDAY 6 APRIL

Royal Institute of Chemistry

Slough: I.C.I. Paints Division, Wexham Road, 6.30 p.m. 'Principles and Practice of Polymer Design' by R. B. Richards, and 'Colour Psychology and Colour Measurement' by P. S. Williams.

Society for Analytical Chemistry

London: Chemical Society Meeting Room, Burlington House, Piccadilly, 7 p.m. 'The Location of the End-point in Titrimetric Procedures' by E. Bishop; 'End-point Determination of High-frequency Methods' by J. P. Dowdall, D. V. Sinkinson and H. Stretch; 'Spectrophotometric Titrations' by Dr. R. A. Chalmers; and 'A Short Account of the Scope and Precision of Amperometric Titration' by J. Watt. (Meeting organised by Physical Methods Group.)

Institute of Metal Finishing

Glasgow: Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, 7 p.m. 'Diagnosis of Plating Shop Troubles' by E. A. Ollard.

THURSDAY 7 APRIL

Institute of Metal Finishing

Manchester: Engineers' Club, Albert Square, 7.30 p.m. 'Problems of a Paint Shop Controller' by R. M. C. Logan.

Textile Institute

Manchester: 10 Blackfriars Street, 7 p.m. 'Economics, Technology and Rayon Weaving' by Mrs. P. Mars.

Market Reports

LONDON.—The movement against contracts to the chief industrial outlets has been fully maintained during the past week and there has been a steady flow of new business on home account in almost all sections of the market. The supply position is good for most of the industrial chemicals and prices generally display a firm undertone. Export trade in chemicals is reported to be keeping well up to the recent satisfactory level. There have been no price changes reported in the coal tar products market, there being a continued steady demand for creosote oil, carbolic acid and cresylic acid.

MANCHESTER.—Most of the industrial outlets have continued to take reasonably good supplies of heavy chemicals during the past week and no lack of replacement buying has been reported on the Manchester market. Although the cotton textile bleaching and allied trades are calling for steady deliveries under contracts the outlook is not too promising in view of the fact that a number of Lancashire mills are operating below capacity. Prices generally are steady, with the advance in borax and boric acid the outstanding changes. An improved demand is reported for fertilisers, with carbolic acid, creosote oil and most other leading tar products finding a ready outlet.

GLASGOW.—The past week opened rather quietly, but towards the end general improvement has to be reported, with the demand for agricultural chemicals intensifying. Numerous inquiries are still being received for export, and generally speaking the past week has been satisfactory.

Glass Fibres for Dunlop

THE Dunlop group of companies is entering the glass fibre field and Semtex, the flooring division of the group in South Wales, is engaged on development work on products made from glass-fibre reinforced resin. It is hoped to make chairs of the stacking type, acid-proof containers for industrial and chemical processes, pipes and body parts for vehicles and pipes. A polyester resin is used, and the material resulting has half the weight but five times the strength of its equivalent in steel. Application has been made for the registration of the mark 'Fortrez' to describe the materials.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 *inclusive, or a woman aged* 18-59 *inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.

MANAGERIAL PERSONNEL NEEDED FOR RESEARCH CENTRE IN THE PETROLEUM INDUSTRY

ENTE NAZIONALE IDROCARBURI (E.N.I.) has under its supervision a number of Italian Companies active in the field of petroleum and petrochemicals. E.N.I.'s major activity is centred in the following items :—

— gas and oil field exploration and exploitation (current production : 105 billion cu. ft. of natural gas per year) ;

— operator of a 2,500-mi. pipe-line system (capacity, over 700 million cu. ft. per day) ;

— owner and operator of a tanker fleet of around 120,000 dwt. ;

— owner and operator of an extensive network for distribution of petroleum products and LP-gas throughout Italy (64 bulk plants, 4,000 stations, etc.) ;

— control over or shareholding in refineries having a processing capacity of about 6 million tons of crude oil per year ;

— owner of factories (1,500 employees) for construction of machinery ;

— shareholding of chemical plants (700 employees) for production of synthetic dyes, detergents, etc. ;

— under construction, a petrochemical plant (production capacity : 30,000 tons per year of synthetic rubber and 350,000 tons per year of ammonium nitrate).

E.N.I. is organising a big research centre for investigation and development of petroleum processing and manufacture of petrochemicals. Some departments are expected to begin operation next summer.

Italian or foreign technical experts, with a wide educational background, specific training, organisational and managerial ability, are required to fill positions as heads of the main departments of the laboratories.

Specifically, the following are sought :—

(1) **CHEMIST** or **PHYSICIST** with specific knowledge and experience in thermodynamic and chemico-physical problems ;

(2) **CHEMIST** specialised in the preparation of organic compounds, particularly those derived from hydrocarbons ;

(3) **INORGANIC CHEMIST,** soundly and completely acquainted with modern methods of experimentation, research and testing ;

(4) **ENGINEER** or **INDUSTRIAL CHEMIST** specially trained in the methods for improving petroleum products applications ;

(5) **ENGINEER** or **PHYSICIST,** with physico-technical and technological training, specialised in the problems of thermo-technics, measurements and controls ;

(6) **ENGINEER** or **INDUSTRIAL CHEMIST** with extensive research experience in the field of crude oils processing ;

(7) **ENGINEER** or **INDUSTRIAL CHEMIST** particularly experienced in extending laboratory procedures to pilot plants ;

(8) **ENGINEER** with good theoretical knowledge and laboratory experience in engine tests on fuels and lubricating oils ;

(9) **ENGINEER** or **INDUSTRIAL CHEMIST** specially trained both in theory and practice in the fields of corrosion and protective means for materials.

Note.—University degree mandatory.

Applications should state age and other usual personal data, educational background and qualifications, practical experience, etc., and should include a photograph. Please address personally to :

THE PRESIDENTE
DELL'ENTE NAZIONALE IDROCARBURI,
VIA LOMBARDIA, 43,
ROMA,
ITALY.

with the special note RISERVATA PERSONALE (i.e., to be opened by addressee only).

Absolute discretion in every respect is assured.

Salary offered will be in accordance with position, training and qualities required.

BRITISH ELECTRICITY AUTHORITY
SOUTH EAST SCOTLAND DIVISION
STATION CHEMIST PORTOBELLO POWER STATION

APPLICATIONS are invited for the appointment of Station Chemist at Portobello Power Station.

Candidates should preferably have a degree in Industrial Chemistry and have experience in the analysis of coal, water and oils as used in modern power stations. Knowledge of corrosion chemistry, metallurgy and metalography as applied to steel alloys for high temperature steam power purposes would be an advantage.

Salary scale £900-£975 (N.J.B. Class J/7). Pension Scheme.

Apply in writing within one week of the appearance of this advertisement to Establishment Officer, British Electricity Authority, South East Scotland Division, British Electricity House, Portobello, Midlothian.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requires a **CHEMIST** (basic grade), to undertake the control of gas purification and other chemical production plants in the Chemical Engineering Branch. Candidates should be Corporate Members of the Institution of Chemical Engineers or the Royal Institute of Chemistry, or have exempting qualifications; or hold an Honours Degree in Chemistry or Chemical Engineering. Previous experience of plant control work, especially gas handling plants, would be advantageous.

SALARY.—£695 (age 25) to £1,065 per annum (male). The successful applicant will be required to join the Authority's Contributory Superannuation Scheme.

HOUSING accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishment's transport facilities. During this period lodging allowance may be payable.

Send postcard for application form, to:

SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote reference 575/WGE/38.

EAST MIDLANDS GAS BOARD
APPOINTMENT OF DIVISIONAL CHEMIST
SHEFFIELD AND ROTHERHAM DIVISION

APPLICATIONS are invited from suitably qualified persons for the position of Divisional Chemist in the Sheffield and Rotherham Division of the East Midlands Gas Board, at a commencing salary at the rate of £1,000 per annum.

Candidates should hold a Degree in Chemistry or possess an equivalent qualification, and preferably should have experience of modern methods of testing applicable in Gas Works.

The successful applicant will be responsible to the Divisional Engineer for the Central Chemical Laboratory, and for official gas testing stations. He will also be required to carry out special investigations as may be required.

The position is pensionable and the successful applicant will be required to pass a medical examination.

Applications, giving details of education, training, qualifications and experience, together with the names and addresses of two referees, should be addressed to reach Mr. C. C. Wood, Divisional General Manager, Sheffield and Rotherham Division, East Midlands Gas Board, Commercial Street, Sheffield, 1, not later than the **25th April, 1955.**

A. GWYNNE DAVIES, Secretary.

UNITED KINGDOM ATOMIC ENERGY AUTHORITY
ATOMIC WEAPONS RESEARCH ESTABLISHMENT,
ALDERMASTON, BERKS,
requires
EXPERIMENTAL OFFICERS
for the following posts:—

POST 1—287/WGE/38.—To assist in the design and development of ultra-high-speed electronic counting equipment for use with scintillation and other types of radiation detecting instruments. Experience in the design and construction of wide-band electronic amplifiers would be advantageous.

POST 2—557/WGE/38.—To assist in experimental work in the Chemical Engineering Laboratory, mainly with pilot scale equipment. Applicants should have had a chemical engineering training and some years' experience in the operation and development of pilot and small scale plants.

The minimum qualification is Higher School Certificate in Science subjects or equivalent, but a Higher National Certificate in Applied Physics for Post 1 and a pass degree in Chemical Engineering for Post 2, is desirable.

SALARY.—(Minimum age, 26), £775 to £945 per annum (male).

SUPERANNUATION.—The successful applicants will be required to join the Authority's contributory scheme.

HOUSING.—Housing accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishment's transport facilities. During this period lodging allowance may be payable. Send postcard for application form to:

SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote appropriate reference.

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requires:—

Post 1. 572/WGE/38. A PRINCIPAL SCIENTIFIC OFFICER OR SENIOR SCIENTIFIC OFFICER, to lead a section consisting of Chemists and Chemical Engineers, carrying out development work in a new field of inorganic materials technology, the aim of which is to find the best means of making components from reactive chemicals. Applicants must hold a First- or Second-Class Honours Degree in Chemistry or Chemical Engineering, and have had many years' experience, preferably of work in the fields of casting, pelleting of powders, sintering or slurry pouring.

Post 2. 573/WGE/38. A SENIOR SCIENTIFIC OFFICER, to be responsible for the initial design of a special prototype plant for manufacture of an inorganic chemical, and development into works scale production units. Applicants must hold a First- or Second-Class Honours Degree in Chemical Engineering or be Corporate Members of the Institution of Chemical Engineers, or have equivalent qualifications. In addition they should have had several years' research or development experience in Chemical Engineering.

SALARY.—Principal Scientific Officer, £1,205 to £1,615 per annum (male); Senior Scientific Officer, £1,040 to £1,205 per annum (male). Successful candidates will be required to join the Authority's Contributory Superannuation Scheme.

HOUSING accommodation will be available within a reasonable period for married staff who live outside the radius of the Establishment's transport facilities.

Send postcard for application form, to:

SENIOR RECRUITMENT OFFICER,
A.W.R.E.,
ALDERMASTON, BERKS.
Quote appropriate reference.

SENIOR SCIENTIFIC OFFICERS; SCIENTIFIC OFFICERS. The Civil Service Commissioners invite applications for pensionable appointments. Applications may be accepted up to December 31st, 1955, but early application is advised, as an earlier closing date may be announced. Interview Boards will sit at frequent intervals. The Scientific posts cover a wide range of scientific research and development in most of the major fields of fundamental and applied science. In biological subjects the number of vacancies is small; individual vacancies exist for candidates who have specialised in Palaeobotany, Foraminifera, Malacology, and Lichenology.

Candidates must have obtained a University Degree with First- or Second-Class Honours in an appropriate scientific subject (including Engineering) or in Mathematics, or an equivalent qualification; or possess high professional attainments. Candidates for Senior Scientific Officer posts must in addition have had at least three years' post-graduate or other approved experience.

Candidates taking their degrees in 1955 may apply before the result of their degree examination is known.

AGE LIMITS.—Senior Scientific Officers, between 26 and 31, but specially suitable candidates under 26 may be admitted. For Scientific Officers between 21 and 28 during 1955 (up to 31 for permanent members of the Experimental Officer class). Salary: (London) Senior Scientific Officers: (men), £1,010 to £1,185; (women), £875 to £1,060. Scientific Officers (men), £492 to £885; (women), £492 to £780. Somewhat lower rates in the provinces.

Further particulars from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, 30, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S53/55 for Senior Scientific Officers and S52/55 for Scientific Officers.

ROYAL MINT has a vacancy to be filled as **SCIENTIFIC OFFICER** or **SENIOR SCIENTIFIC OFFICER,** according to qualifications and experience. Candidates must have First- or Second-Class Honours degree in Metallurgy, or in Physics and Chemistry, if with metallurgical experience. The general qualifications and conditions are as set out in the main advertisement above. Candidates for this post should quote S.4424/53/55 and the closing date for applications is April 30th, 1955.
5713/190/3/55/SD/b.

Situations Vacant *continued*

THE UNITED KINGDOM ATOMIC ENERGY AUTHORITY, ALDERMASTON, BERKS, requires **EXPERIMENTAL OFFICERS.**

Post 1. 576/WGE/38. To be concerned with the application of the properties of small particles to problems of high density powder packing, the possibility of slurries, the effects of milling variables, etc. Previous experience in allied work would be an advantage. The minimum qualification is Higher School Certificate (Science) or equivalent.

Post 2. 577/WGE/38. To work on the development of processes concerned with the handling of large components made of reactive chemical substances. Applicants should be used to working with mechanical engineers on the development of specialised mechanical gear. The minimum qualification is Higher School Certificate (Science) or equivalent.

Post 3. 578/WGE/38. To take part in the design and development of special plants involving the testing of prototype equipment, and assistance in developing the final plant designs. Experience in the operation of experimental plants and an understanding of chemical engineering principles are essential. The minimum qualification is Inter.B.Sc. or Higher National Certificate in Chemical Engineering. A degree in Chemical Engineering would be an advantage.

SALARY : £775-£945 p.a. (male) (minimum age 26). Successful candidates will be required to join the Authority's contributory superannuation scheme.

HOUSING accommodation will be available within a reasonable period for married staff who live outside the Establishment's transport facilities. During this period a lodging allowance may be payable.

Send postcard for application form to Senior Recruitment Officer, A.W.R.E., Aldermaston, Berks. Quote appropriate reference.

FOR SALE

THE BOARD OF TRADE have for disposal about 1,184 tons of Kieserite, calcined, low in chloride content, of German origin, packed in multi-ply paper bags (some of which are in damaged condition), and hessian sacks.

This material has been in store for about three years and is described in the terms of its original description.

Full particulars and forms of tender may be obtained on application to **THE BOARD OF TRADE, C. & G. 8(B), ROOM 317, LACON HOUSE, THEOBALDS ROAD, LONDON, W.C.1.** (Telephone : Chancery 4411—Extension 329.)

CHARCOAL, ANIMAL AND VEGETABLE horticultural, burning, filtering, disinfecting, medicinal, insulating; also lumps ground and granulated; established 1830; contractors to H.M. Government.—THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E. TELEGRAMS: "HILL-JONES, BOCHURCH LONDON." TELEPHONE: 3285 EAST.

DEHNE FILTER PRESS—26 cast-iron plates, 25 in. by 25 in. 2 in. centre hole ; screw 3½ in. diam.; 2 columns 3¼ in. ; overall 9 ft. by 3 ft. 4 in. by 4 ft. high.

Good condition.

THOMPSON & SON (MILLWALL), LTD.,

LONDON, E.14.

Tel. EAST 1844.)

FOR SALE
IMMEDIATE DELIVERY

35,000 ft. Excellent 3 in. Screwed and Socketted Mild Steel Piping in lengths 20 ft. 30 ft. "C" and "B" qualities.

MADEN & MACKEE, LTD.,
317, PRESCOT ROAD,
LIVERPOOL, 13.

ECONOMIC BOILERS. Two 8 ft. diam., 220 lb. w.p., 5,000 lb. evaporation ; three 7 ft. 6 in. diam., 160 lb. w.p., 4,500 lb. evaporation ; 400 other boilers in stock.

STAINLESS PRESSURE TANK, 19 ft. by 5 ft. diam., 110 lb. w.p. Unused.

STAINLESS PANS : four 60 gal. double jacketed ; 120 gal. jacketed with agitator.

TWO 35 ft. long by 9 ft. diam. Lead-lined **TANKS.**

TWO Broadbent **WATER-DRIVEN CENTRIFUGES,** 30 in. diam., 12 in. deep, 1,150 r.p.m.

SIX Aluminium **CONDENSERS,** 14 ft. long by 2 ft. 6 in. diam. 386 Tubes, ¾ in. o.d.

FORTY Riveted **RECEIVERS,** 8 ft. 6 in. long, 5 ft. 6 in. diam., 75 lb. w.p. Numerous other sizes.

Solid Drawn **STEEL PIPES,** 6 in., 8 in., 10 in., 12 in., 14 in., thousands of feet in stock, plain and flanged.

CAST-IRON PIPES, 1,200 yds. 10 in. and 400 yds. 8 in., **NEW.** Also most other sizes, up to 24 in. bore.

VALVES in Stainless, Gunmetal, Enamel Lined.

CAST-IRON TANK PLATES, 2 ft. square. 500 in stock.

Free Catalogue "Watkins Machinery Record," available.

FRED WATKINS (BOILERS), LTD.,
COLEFORD, GLOS.

DRUMS FOR SALE, capacity 16 gallons, 16 gauge throughout. Immediate delivery from stock. Reduced price to clear. Apply **STEEL DRUMS, LIMITED, 118, BURDON LANE, SUTTON, SURREY.**

MORTON, SON AND WARD, LIMITED,
offer

100 G., 150g. and 200g. **JACKETED PANS**—new, in mild steel, for 100 lb. w.p. Mixing gear fitted if required.

3 cwt. **TROUGH MIXERS** by **CHALMERS and GARDNER**—stainless steel lined troughs.

50/100g. heavy duty **MIXERS** by **FALLOWS AND BATES**—agitators driven through bevel gears from fast and loose pulley.

200g. cast-iron **JACKETED MIXING VESSEL** with nickel-chrome impellor type agitator driven through bevel gears from fast and loose pulley.

25g. and 50g. **TILTING TROUGH MIXERS** by **RICHMOND & CHANDLER**—double "Z" blades. Stainless steel interior.

One **NEW STAINLESS STEEL JACKETED PAN**—mounted on stand. 40 lb. w.p. in jacket.

A selection of new **MONO** and other second-hand **PUMPS** in stock.

Inquiries invited.

MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NR. OLDHAM.
LANCS.
'Phone Saddleworth 437.

TWO **BRAND NEW STERILISING VESSELS**—7 ft. long by 3 ft. diameter.

One **S. J. WERNER MIXER** with pan approx. 2 ft. by 2 ft. of the tilting type.

Two steam jacketed **CAST-IRON FILTER PRESSES**—each with 38 s.j. plates and 39 frames, cake size 2 ft. 4 in. square.

Several **JOHNSON CAST-IRON FILTER PRESSES**—various sizes and types.

GARDNER MIXERS and Mixers and Sifters combined, sizes "E," "G," "H" and experimental.

HYDRO EXTRACTORS—24 in., 30 in. and 36 in.

Two Gardner "H" size Steam-jacketed **MIXERS.**

Two 18 in. **KEK PLATE MILLS**—with feeders delivery bins, motors and entablature.

Two No. 4 **SUPER MIRACLE MILLS** with motors and starters.

Three Single-effect **EVAPORATORS** by Scott, with pumps and motors.

RICHARD S'ZER, LTD.,
ENGINEERS,
HULL.
Telephone : 31743.

600

UNUSED "WESTON" SUSPENDED TYPE HYDRO EXTRACTOR by **Manlove Alliott,** 42 in. diam. bottom discharge, 20 in. deep vulcanised basket and monitor casing, $\frac{1}{16}$ in. diam. perforations. Overdriven through centrifugal clutch by 6/3 h.p. A.C. motor with starter. Fitted mechanically and electrically operated safety guards.

UNUSED DIGESTORS or **CARBONATORS** for CO impregnation by **Hopkins.** Copper construction, 3 ft. 6 in. long by 1 ft. 6 in. diam. fitted agitator, geared motor drive. Mounted in steel frame. All fittings.

AUTOMATIC BOTTLE LABELLING MACHINE by **Peters of Slough,** capable of labelling bottles up to 10 in. high and singly up to 4 in. wide or in pairs up to 2 in. wide, approximately 60 per min. singly, or 120 per min. in pairs. Single bottles or pairs tipped on to conveyor belt and conveyed to first adjustable stop to position them. When released bottles stop at glueing, labelling and pressing stations in sequence. Easily adjustable to varying sizes, labels transferred to glued bottle direct from magazine, but suction cap pick-up provided for extra small labels. Drive from 1/3rd h.p. A.C. motor.

AUTOMATIC CAPPING MACHINE by **Peters of Slough,** suitable for pre-screwed caps and bottles or jars. Speed about 200 per min. but capable of up to 300 per min. Sizes from 2¾ in. to 10 in. high by 4 in. diam. or width. Bottles travel along conveyor, each selecting cap when passing under hopper. Two pairs spring-loaded rubber belt grip bottle, whilst cap rubs along rubber strip for initial tightening. Three pairs rubber rollers complete tightening whilst bottle held between bands, one ¾ h.p. and two ¼ h.p. A.C. motors.

OINTMENT MILL by **Wilkinson.** Chamber 18 in. diam. by 9 in. deep. propeller type agitator; rotor and stator fluted stone grinding discs. Underdriven through gearing by fast and loose pulleys.

NEW PORCELAIN AND SILEX-LINED BALL MILLS. Capacities ranging from 9 gallons to 260 gallons.

NEW STAINLESS STEEL VESSELS AND STORAGE TANKS. Capacities ranging from 8 gallons to 1,000 gallons.

GEORGE COHEN, SONS & CO., LTD.,
WOOD LANE, LONDON, W.12.
Tel.: Shepherds Bush 2070, and
STANNINGLEY, NR. LEEDS.
Tel.: Pudsey 2241.

PHONE 98 STAINES

TRIPLE Roll W.C. "Baker" **REFINERS**—31½ in. by 15 in., 15 h.p., 400/3/50.
"Johnson" **ALUMINIUM FILTER PRESS**—18—14 in. sq. chambers.
"Barron" "**U-**"**-TROUGH MIXER**—7 ft. 6 in. by 3 ft. by 3 ft.
"Hind & Lund" **SIFTER/MIXER/SIFTER** with mixer—60 in. by 18 in. by 20 in. deep.
65 ft. Flat Belt 36 in. wide **CONVEYOR.**
40 ft. **TROUGH CONVEYOR**—30 in. wide.
BUCKET ELEVATORS—40, 30, 23 and 17 ft. centres.
EXTRUDERS AND PLODDERS—5 in., 8 in. and 12 in. worms.
(30) "**Z**"**AND FIN BLADE MIXERS** up to 42 in. by 28 in. by 38 in.
PUMPS, PANS, HYDROS, STILLS, AUTOCLAVES, OVENS, CONDENSERS, BOILERS, etc.
HARRY H. GARDAM & CO., LTD.,
STAINES.

SELWOOD FOR PLANT
STORAGE TANKS FOR SALE

HORIZONTAL CYLINDRICAL
500 gal. to 12,000 gal., new and second-hand.
VERTICAL CYLINDRICAL
25 gal. TVO and 9,000 gal.
RECTANGULAR ENCLOSED
100 gal. to 1,200 gal., new and second-hand.
OVAL—LORRY MOUNTING
200 gal. to 4,000 gal., all types.
Full list on request.
WILLIAM R. SELWOOD, LTD.,
CHANDLERS FORD, HANTS.
'Phone 2275.

SACK AND BAG MERCHANTS AND MANUFACTURERS. New and reconditioned for Home and Export. (Use **JUTEX** for sack repairing). **ALTRINCHAM JUTE LTD., WRIGHT STREET, BROADHEATH, ALTRINCHAM, CHESHIRE.** ALTrincham 4360.

WANTED

CASH BUYERS
all grades of
NON-FERROUS METAL RESIDUES.
SEND SAMPLES AND DETAILS.
D. HARRIS,
28, Geary Road,
DOLLIS HILL,
LONDON, N.W.10.
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PATENTS

THE Proprietor(s) of Patent No. 648406, for "**PROCESS FOR MAKING ORGANO-SILICON COMPOUNDS,**" desire(s) to secure commercial exploitation by licence or otherwise in the United Kingdom. Replies to Haseltine, Lake & Co., 28, Southampton Buildings, Chancery Lane, London, W.C.2.

THE Proprietor of British Patent No. 668968, relating to a "**COLLOIDAL IODINE PREPARATION AND METHOD OF MAKING THE SAME,**" is desirous of entering into negotiations with firms in this country for the purpose of exploiting the above invention, either by sale of the patent rights or by granting of licences to manufacture on a royalty basis. Inquiries should be addressed to Abel & Imray, Quality House, Quality Court, Chancery Lane, London, W.C.2.

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